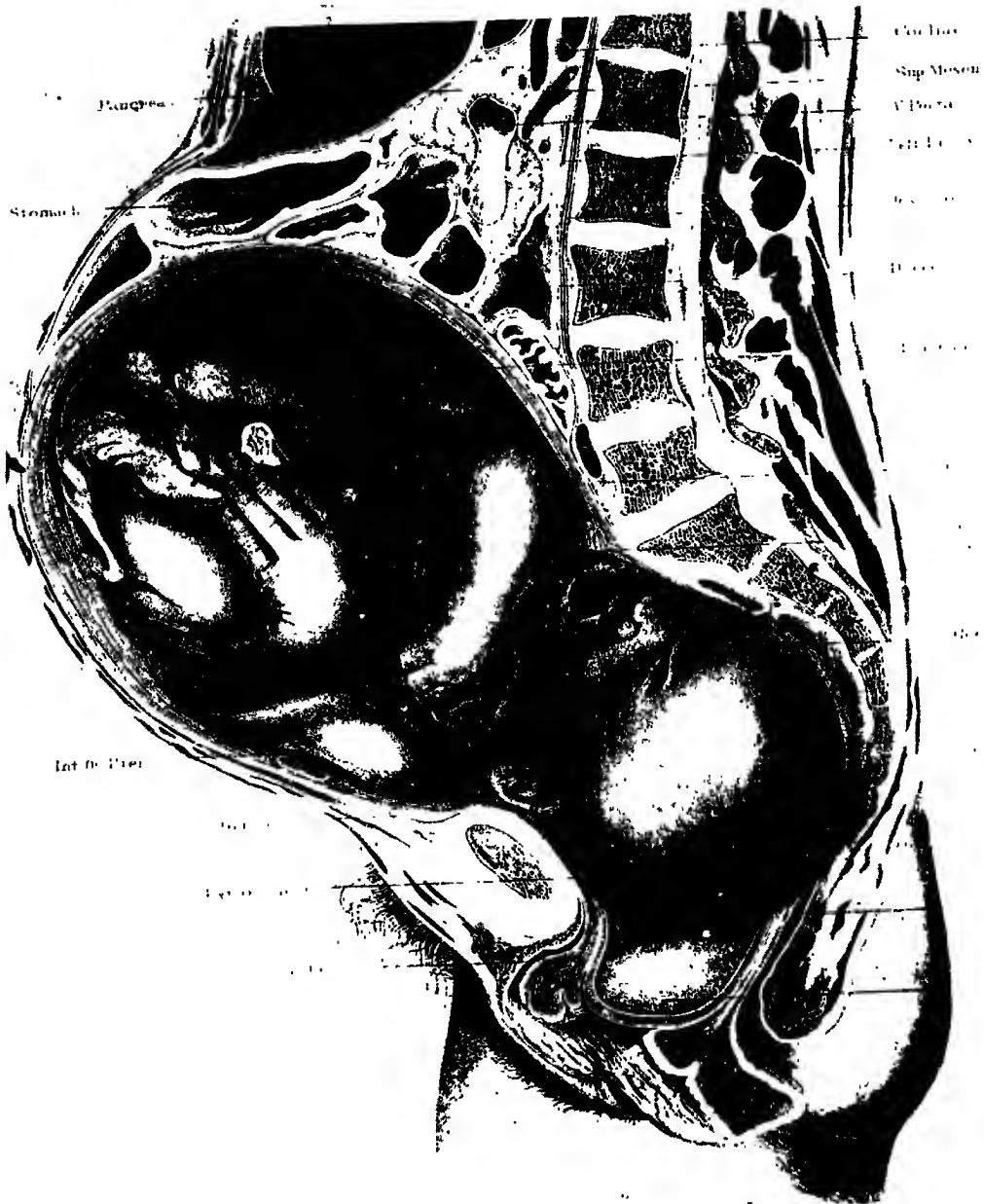


MIDWIFERY

VOL. II.



Diaphragm

Stomach

Int. O. Liver

Clav. Int.
Sup. Mesen.
V. Porta
V. Cava
H. Cava
D. Cava
L. Cava

A TREATISE
ON
THE SCIENCE AND PRACTICE
OF
MIDWIFERY

BY

W. S. PLAYFAIR, M.D., F.R.C.P.

PROFESSOR OF OBSTETRIC MEDICINE IN KING'S COLLEGE; PHYSICIAN FOR THE DISEASES OF
WOMEN AND CHILDREN TO KING'S COLLEGE HOSPITAL; EXAMINER IN MIDWIFERY
TO THE UNIVERSITY OF LONDON; LATE EXAMINER IN MIDWIFERY TO
THE ROYAL COLLEGE OF PHYSICIANS; AND VICE-PRESIDENT
OF THE OBSTETRICAL SOCIETY OF LONDON.

IN TWO VOLUMES

VOL. II.

LONDON
SMITH, ELDER, & CO., 15 WATERLOO PLACE.
1876

CONTENTS

OF

THE SECOND VOLUME.

PART III.—(*Continued.*)

LABOUR.—(Continued.)

CHAPTER IX.

PROLONGED AND PRECIPITATE LABOURS.

	PAGE
Evil effects of Prolonged Labour—Influence of the Stage of Labour in Protraction—Delay in First Stage rarely Serious—Temporary Cessation of Pains—Symptoms of Protraction in the Second Stage—State of the Uterus in Protracted Labour—Cases of Protraction due to Morbid condition of the expulsive powers—Causes of Protraction—Treatment—Oxytocic remedies—Ergot of Rye, &c.—Manual Pressure—Instrumental Delivery—Precipitate Labour—Its Causes and Treatment	1

CHAPTER X.

LABOUR OBSTRUCTED BY FAULTY CONDITION OF THE SOFT PARTS.

Rigidity of the Cervix: its Causes, Effects, and Treatment—Bands and Cicatrices in the Vagina—Extreme rigidity of the Perineum—Labour complicated with Tumour—Vaginal Cystocele—Calculus—Hernial Protrusions—Œdema of Vulva—Hæmatic effusions, &c.	18
--	----

CHAPTER XI.

DIFFICULT LABOUR DEPENDING ON SOME UNUSUAL CONDITION OF THE FŒTUS.

Plural Births, Treatment of—Locked Twins—Conjoined Twins—Intra-uterine Hydrocephalus: Its Dangers, Diagnosis, and Treatment—Other dropsical Effusions—Fœtal Tumours—Excessive Development of Fœtus	33
--	----

CHAPTER XII.

DEFORMITIES OF THE PELVIS.

	PAGE
Classification—Causes of Pelvic Deformity—Rickets and Osteo-malacia— The Equally enlarged Pelvis—The Equally contracted Pelvis—The Un- developed Pelvis—Masculine or Funnel-shaped Pelvis—Contraction of Conjugate Diameter of the Brim—Figure of Eight deformity—Spondy- lolithesis—Narrowing of the Oblique Diameters—Obliquely contracted Pelvis—Kyphotic Pelvis—Robert's Pelvis—Deformity from old standing Hip-joint disease—Deformity from Tumours, Fractures, &c.—Effects of Contracted Pelvis on Labour—Risks to the Mother and Child—Mechan- ism of delivery in Head Presentations; α , in Contracted Brim: β , in Generally contracted Pelvis—Diagnosis—External Measurements—In- ternal Measurements—Mode of estimating the Conjugate diameter of the brim—Mode of Diagnosing the Oblique Pelvis—Treatment—The Forceps & Turning—The Induction of Premature Labour—Induction of Abortion	49

CHAPTER XIII.

HÆMORRHAGE BEFORE DELIVERY: PLACENTA PRÆVIA.

Definition—Causes—Symptoms—Sources and Causes of Hæmorrhage— Prognosis—Treatment	78
---	----

CHAPTER XIV.

HÆMORRHAGE FROM SEPARATION OF A NORMALLY SITUATED PLACENTA.

Causes and Pathology—Symptoms and Diagnosis—Prognosis—Treatment	94
---	----

CHAPTER XV.

HÆMORRHAGE AFTER DELIVERY.

Its frequency—Generally a preventible accident—Causes—Nature's method of Controlling Hæmorrhage—Uterine Contraction—Thrombosis— Secondary Causes of Hæmorrhage—Irregular Uterine Contraction—Pla- cental Adhesions—Constitutional Predisposition to Flooding—Symptoms —Preventive treatment—Curative treatment—Secondary post-partum Hæmorrhage—Its Causes and Treatment	99
---	----

CHAPTER XVI.

RUPTURE OF THE UTERUS, ETC.

Its Fatality—Seat of Rupture—Causes, predisposing and exciting—Symp- toms—Prognosis—Treatment: when the Fœtus remains in Utero; when the Fœtus has escaped out of the Uterus—Recapitulation—Lace- rations of the Vagina—Vesico and Recto-vaginal Fistulæ—Their mode of Formation—Treatment	120
--	-----

CHAPTER XVII.

INVERSION OF THE UTERUS.

Division into Acute and Chronic forms—Description—Symptoms—Diagnosis—Mode of production—Treatment	PAGE 132
---	-------------

PART IV.

OBSTETRIC OPERATIONS.

CHAPTER I.

INDUCTION OF PREMATURE LABOUR.

History—Objects—May be performed either on account of the Mother or Child—Modes of Inducing Labour—Puncture of Membranes—Administration of Oxytocics—Means acting indirectly on the Uterus—Dilatation of Cervix—Separation of Membranes—Vaginal and Uterine douches—Introduction of Flexible Catheter	139
---	-----

CHAPTER II.

TURNING.

History—Turning by External Manipulation—Object and Nature of the operation—Cases Suitable for the operation—Statistics and Dangers—Method of performance—Cephalic Version—Method of performance—Podalic Version—Position of Patient—Administration of Anæsthetics—Period when the operation should be undertaken—Choice of Hand to be used—Turning by Bi-polar method—Turning when the Hand is introduced into the Uterus—Turning in Abdomino-anterior Positions—Difficult cases of Arm Presentation	150
---	-----

CHAPTER III.

THE FORCEPS.

Frequent use of the Forceps in Modern practice—Description of the Instrument—The Short Forceps—Its Varieties—The Long Forceps—Suitable to all cases alike—Action of the Instrument—Its powers as a Tractor, Lever, and Compressor—Preliminary considerations before operation—Use of Anæsthetics—Description of the Operation—Low Forceps Operation—High Forceps Operation—Possible Dangers of Forceps Delivery—Possible Risks to the Child	171
---	-----

CHAPTER IV.

THE VECTIS.—THE FILLET.

	PAGE
Nature of the Vectis—Its use as a Lever or Tractor—Cases in which it is applicable—Its use as a Rectifier of Malpositions—The Fillet—Nature of the Instrument—Objections to its use	189

CHAPTER V.

OPERATIONS INVOLVING THE DESTRUCTION OF THE FŒTUS.

Their Antiquity and History—Division of Subject—Nature of Instruments employed—Perforator—Crutchet—Craniotomy Forceps—Cephalotribe—Forceps-saw—Écraseur—Cases requiring Craniotomy—Method of Perforation—Extraction of the Head—Comparative merits of Cephalotribe and Craniotomy—Extraction by the Craniotomy Forceps—Extraction of the Body—Embryotomy—Decapitation and Evisceration	192
--	-----

CHAPTER VI.

THE CÆSAREAN SECTION—SYMPHYSEOTOMY—GASTRO-ELYTROTONY.

History of the operation—Statistics—Results to Mother and Child—Causes requiring the operation—Post-mortem Cæsarean Section—Causes of Death after the Cæsarean Section—Preliminary Preparations—Description of the operation—Subsequent Management—Substitutes for the Cæsarean Section—Symphyseotomy—Gastro-elytrotomy	211
---	-----

CHAPTER VII.

THE TRANSFUSION OF BLOOD.

History—Nature and Object of the operation—Use of Blood taken from the Lower Animals—Difficulties from Coagulation of Fibrine—Modes of Obviating them—Mediate Transfusion—Addition of Chemical Agents to prevent Coagulation—Defibrination of the Blood—Statistical Results—Possible Dangers of the Operation—Cases suitable for Transfusion—Description of the Operation—Effects of Successful Transfusion—Secondary Effects of Transfusion	228
--	-----

PART V.

THE PUERPERAL STATE.

CHAPTER I.

THE PUERPERAL STATE AND ITS MANAGEMENT.

	PAGE
Importance of Studying the Puerperal State—The Mortality of Child-birth—Alterations in the Blood after Delivery—Condition after Delivery—Nervous Shock—Fall of the Pulse—The Secretions and Excretions—Secretion of Milk—Changes in the Uterus after Delivery—The Lochia—The After-pains—Management of Women after Delivery—Treatment of Severe After-pains—Diet and Regimen	241

CHAPTER II.

MANAGEMENT OF THE INFANT, LACTATION, ETC.

Commencement of Respiration after the Birth of the Child—Apparent Death of the new-born Child—Its Treatment—Washing and Dressing the Child—Application of the Child to the Breast—The Colostrum and its properties—Secretion of Milk—Importance of Nursing—Selection of a Wet-nurse—Management of Lactation—Diet and Regimen of Nursing Women—Period of Weaning—Disorders of Lactation—Means of Arresting the Secretion of Milk—Defective Secretion of Milk—Depressed Nipples—Fissures and Excoriations of the Nipples—Excessive Flow of Milk—Mammary Abscess—Hand-feeding—Causes of Mortality in Hand-feeding—Various kinds of Milk—Method of Hand-feeding	254
---	-----

CHAPTER III.

PUERPERAL ECLAMPSIA.

Its Doubtful Etiology—Premonitory Symptoms—Symptoms of the attack—Condition between the Attacks—Relation of the attacks to Labour—Results to Mother and Child—Pathology—Treatment—Obstetric Management	274
--	-----

CHAPTER IV.

PUERPERAL INSANITY.

Classification—Proportion of Various forms—Insanity of Pregnancy—Predisposing Causes—Period of Pregnancy at which it occurs—Type of Insanity—Prognosis—Transient Mania during delivery—Puerperal
--

Insanity (Proper)—Type of Insanity—Causes—Theory of its dependence on a Morbid State of the Blood—Objections to the theory—Prognosis—Post-mortem signs—Duration—Insanity of Lactation—Type—Symptoms—Of Mania—Of Melancholia—Treatment—Question of Removal to Asylum—Treatment during Convalescence	287
--	-----

CHAPTER V.

PUERPERAL SEPTICÆMIA.

Differences of opinion—Confusion from this cause—Modern view of this disease—History—Its Mortality in Lying-in Hospitals—Numerous Theories as to its Nature—Theory of Local Origin—Theory of an Essential Zymotic Fever—Theory of its identity with Surgical Septicæmia—Nature of this view—Channels through which Septic Matter may be absorbed—Character and Origin of Septic Matter often obscure—Division into Auto-genetic and Hetero-genetic cases—Sources of Self-infection—Sources of Hetero-genetic Infection—Influence of Cadaveric Poison—Infection from Erysipelas—Infection from other Zymotic Diseases—Contagion from other Puerperal Patients—Mode in which the Poison may be conveyed to the Patient—Conduct of the Practitioner in relation to the Disease—Nature of the Septic Poison—Local changes resulting from the absorption of Septic Material—Channels through which Systemic Infection is produced—Pathological Phenomena observed after general Blood Infection—Four principal Types of Pathological Change—Intense cases without marked Post-mortem Signs—Cases characterised by Inflammation of the Serous Membranes—Cases characterised by changes in the Mucous Membranes—Cases characterised by the impaction of Infected Emboli, and Secondary Inflammation and Abscess—Description of the Disease—Duration—Varieties of Symptoms in different cases—Symptoms of Local Complications—Treatment	302
---	-----

CHAPTER VI.

PUERPERAL VENOUS THROMBOSIS AND EMBOLISM.

Puerperal Thrombosis and its Results—Conditions which favour Thrombosis—Conditions which favour Coagulation in the Puerperal State—Distinction between Thrombosis and Embolism—Is primary Thrombosis of the Pulmonary Arteries possible?—History—Symptoms of Pulmonary Obstruction—Is recovery possible?—Causes of Death—Post-mortem appearances—Treatment	332
--	-----

CHAPTER VII.

PUERPERAL ARTERIAL THROMBOSIS AND EMBOLISM.

Causes—Symptoms—Treatment	348
-------------------------------------	-----

CHAPTER VIII.

OTHER CAUSES OF SUDDEN DEATH DURING LABOUR AND THE PUERPERAL STATE.

	PAGE
Organic and Functional causes—Idiopathic Asphyxia—Pulmonary Apoplexy—Cerebral Apoplexy—Syncope—Shock and Exhaustion—Entrance of Air into the Veins	351

CHAPTER IX.

PERIPHERAL VENOUS THROMBOSIS (SYN: CRURAL PHLEBITIS—PHLEGMASIA DOLENS—ANASARCA SEROSA—CEDEMA LACTEUM—WHITE LEG, ETC.)

Nature—Symptoms—History and Pathology—Anatomical form of the Thrombi in the Veins—Detachment of Emboli—Treatment	355
--	-----

CHAPTER X.

PELVIC CELLULITIS AND PELVIC PERITONITIS.

Two Forms of Disease—Variety of Nomenclature—Importance of Differential Diagnosis—Etiology—Connection with Septicæmia—Seat of Inflammation—Relative Frequency of the two forms of Disease—Symptomatology—Results of Physical Examination—Terminations—Prognosis—Treatment	365
---	-----

ILLUSTRATIONS

TO

THE SECOND VOLUME.

Section of a frozen body at the termination of the first stage of labour (after Braune). The bag of membranes is still unbroken, the cervix is fully dilated, and the head (in the second position) is in the pelvic cavity *Frontispiece*

FIG.	PAGE
116. Labour complicated by Ovarian Tumour	26
117. Twin Pregnancy, Breech and Head presenting	34
118. Head Locking, both Children presenting Head first	36
119. Head Locking, first Child coming Feet first; Impaction of Heads from wedging in Brim	38
120. Labour impeded by Hydrocephalus	44
121. Adult Pelvis retaining its Infantile Type	53
122. Ricketty Pelvis, with backward depression of Symphysis Pubis	55
123. Flatness of Sacrum, with narrowing of Pelvic Cavity	56
124. Pelvis deformed by Spondylolithesis	56
125. Osteo-malacic Pelvis	57
126. Extreme degree of Osteo-malacic Deformity	58
127. Obliquely Contracted Pelvis	59
128. Robert's, or double obliquely Contracted Pelvis	60
129. Bony Growth from Sacrum obstructing the Pelvic Cavity	60
130. Greenhalgh's Pelvimeter	67
131. Section of Fœtal Cranium, showing its Conical Form	72
132. Showing the greater Breadth of the bi-parietal Diameter of the Fœtal Cranium	72
133. Showing the greater Space for the bi-parietal Diameter in certain Cases of Deformity	73
134. Irregular Contraction of the Uterus, with Encystment of the Placenta	103
135. Partial Inversion of the Fundus	133
136. Illustrating the Commencement of Inversion at the Cervix	136
137. Barnes' Bag for Dilating the Cervix	145
138. First Stage of Bi-polar Version	158
139. Second Stage of Bi-polar Version	159
140. Third Stage of Bi-polar Version	160

etc.	PAGE
141. Fourth Stage of Bi-polar Version	160
142. Seizure of the Feet when the Hand is introduced into the Uterus	163
143. Drawing down of the Feet and Completion of Version	164
144. Showing the Error of Attempting to Turn by Seizing the Leg of the same side as the Presenting Shoulder	165
145. Showing that Version is most readily effected by bringing down the Knee of the Opposite Side to the Presenting Shoulder	165
146. Showing the Completion of Version	166
147. Showing the Use of the Right Hand in Abdomino-anterior Positions	168
148. Denman's Short Forceps	172
149. Zeigler's Forceps	174
150. Simpson's Forceps	175
151. Position of Patient for Forceps Delivery, and Mode of Introducing the Blades	181
152. Forceps in position; Traction in the Axis of the Brim, downwards and backwards	183
153. Last Stage of Extraction; the Handles of the Forceps turned upwards towards the Mother's Abdomen	185
154. Vectis with Hinged Handle	190
155. Wilmot's Fillet	191
156. } Various forms of Perforators	194
157. }	
158. }	
159 & 160. Crotchets	195
161. Craniotomy Forceps	196
162. Simpson's Cranioclast	196
163. Hicks' Cephalotribe	198
164. Perforation of the Skull	202
165. Fœtal Head crushed by the Cephalotribe	206
166. Method of Transfusion by Aveling's Apparatus	237

THE SCIENCE AND PRACTICE OF MIDWIFERY.

PART III.—(*continued*).

LABOUR—(*continued*).

CHAPTER IX.

PROLONGED AND PRECIPITATE LABOURS.

AMONG the difficulties connected with parturition there are none of more frequent occurrence, and none requiring more thorough knowledge of the physiology and pathology of labour, than those arising from deficient or irregular action of the expulsive powers. The importance of studying this class of difficult labours will be seen when we consider the numerous and very diverse causes which produce them.

Dystocia
arising
from defec-
tive or irre-
gular ac-
tion of the
uterus.

That the mere prolongation of labour is in itself a serious thing, is becoming daily more and more an acknowledged axiom of midwifery practice; and its recognition is evident when we contrast the statistical returns of such institutions as the Rotunda Lying-in Hospital of late years, with those which were published some twenty or thirty years ago. It may be fairly assumed that the practice of the distinguished heads of that well-known school represents the most advanced and scientific opinion of the day. When we find that, less than thirty years ago, the forceps were not used more than once in 310 labours, while according to the report for 1873 the late Master applied them once in

Evil effects
of prolong-
ed labour.

8 labours, it is apparent how great is the change which has taken place.

Effects of
prolonged
labour.

Labour may be prolonged from an immense number of causes, the principal of which will require separate study. Some depend simply on defective or irregular action of the uterus; others act by opposing the expulsion of the child, as, for example, undue rigidity of the parturient passages, narrowing from tumours, bony deformity, and the like. Whatever the source of delay, a train of formidable symptoms are developed, which are fraught with peril both to the mother and the child. As regards the mother, they vary much in degree and in the rapidity with which they become established. In many cases, in which the action of the uterus is slight, it may be very long before serious results follow; while in others, in which a strongly-acting organ is exhausting itself in futile endeavours to overcome an obstacle, the worst signs of protraction may come on with comparative rapidity.

They vary
much in
different
circum-
stances.

The in-
fluence of
the stage of
labour in
protrac-
tion.

The stage of labour in which delay occurs, moreover, has a marked effect in the production of untoward symptoms. It is a well-established fact that prolongation is of comparatively small consequence to either the mother or child in the first stage, when the membranes are still intact, and when the soft parts of the mother, as well as the body of the child, are protected by the liquor amnii from injurious pressure; whereas it becomes of the utmost importance to both as soon as the head has entered the pelvis, when the uterus is strongly excited by reflex stimulation, when the maternal soft parts are exposed to continuous pressure, and when the tightly-contracted uterus presses firmly on the fœtus and obstructs the placental circulation. It is in reference to the latter class of cases that the change of practice, already alluded to, has taken place, with the most beneficial results both to the mother and child, and especially to the latter.

It must not be assumed, however, that prolongation of labour is of no consequence until the second stage has commenced. The fallacy of such an opinion was long ago shown by Simpson, who proved, in the most conclusive way, that both the maternal and fœtal mortality were greatly increased in proportion to the entire length of the labour; and all

practical accoucheurs are familiar with cases in which symptoms of gravity have arisen before the first stage is concluded. Still, relatively speaking, the opinion indicated is undoubtedly correct.

In the present chapter we have to do only with those causes of delay connected with the expulsive powers. Inasmuch, however, as the injurious effects of protraction are similar in kind, whatever be the cause, it will save needless repetition if we consider, once for all, the train of symptoms that arise whenever labour is unduly prolonged.

As long as the delay is in the first stage only, with rare exceptions, no symptoms of real gravity arise for a length of time; it may be even for days. There is often, however, a partial cessation of the pains, which, in consequence of temporary exhaustion of nervous force, may even entirely disappear for many consecutive hours. Under such circumstances, after a period of rest, either natural or produced by suitable sedatives, they recur with renewed vigour.

Delay in the first stage is rarely serious. Temporary cessation of the pains.

A similar temporary cessation of the pains may often be observed after the head has passed through the os uteri, to be also followed by renewed vigorous action after rest. But now any such irregularity must be much more anxiously watched. In the majority of cases any marked alteration in the force and frequency of the pains at this period indicates a much more serious form of delay, which in no long time is accompanied by grave general symptoms. The pulse begins to rise, the skin to become hot and dry, the patient to be restless and irritable. The longer the delay, and the more violent the efforts of the uterus to overcome the obstacle, the more serious does the state of the patient become. The tongue is loaded with fur, and, in the worst cases, dry and black; nausea and vomiting often become marked; the vagina feels hot and dry, and the ordinary abundant mucous secretion is absent; in severe cases it may be much swollen, and if the presenting part be firmly impacted, a slough may even form. Should the patient still remain undelivered, all these symptoms would become greatly intensified, the vomiting incessant, the pulse rapid and almost imperceptible, low muttering delirium would supervene, and the patient eventually die with all the worst indications of profound irritation and exhaustion.

Symptoms of protraction in the second stage.

So formidable a train of symptoms, or even the slighter

Such symptoms should never be allowed to develop.

degrees of them, should never occur in the practice of the skilled obstetrician; and it is precisely because a more scientific knowledge of the process of parturition has taught the lesson that, under such circumstances, prevention is better than cure, that earlier interference has become so much more the rule.

Those who taught that nothing should be done until nature had had every possible chance of effecting delivery, and who, therefore, allowed their patients to drag on in many weary hours of labour, at the expense of great exhaustion to themselves, and imminent risk to their offspring, made much capital out of the time-honoured maxim that 'meddlesome midwifery is bad.' When this proverb is applied to restrain the rash and uninstructed interference of the ignorant, it is of undeniable value; but, when it is quoted to prevent the scientific action of the experienced, who know precisely when and why to interfere, and who have acquired the indispensable mechanical skill, it is sadly misapplied.

State of the uterus in protracted labour.

The nature of the pains and the state of the uterus, in cases of protracted labour, are peculiarly worthy of study, and have been very clearly pointed out by Dr. Braxton Hicks.¹ He shows that, when the pains have apparently fallen off and become few and feeble, or have entirely ceased, the uterus is in a state of continuous or tonic contraction, and that the irritation resulting from this is the chief cause of the more marked symptoms of powerless labour. If, in a case of the kind, the uterus be examined by palpation, it will be found firmly contracted between the pains. The correctness of this observation is beyond question, and it will, no doubt, often be an important guide in treatment. Under such circumstances instrumental interference is imperatively demanded.

Cases of protraction due to morbid conditions of the expulsive powers.

In considering the causes of protracted labour, it will be well first to discuss those which effect the expulsive powers alone, leaving those depending on morbid states of the passages for future consideration; bearing in mind, however, that the results, as regards both the mother and the child, are identical, whatever may be the cause of delay.

The general constitutional state of the patient may

¹ *Obst. Trans.* vol. ix.

materially influence the force and efficiency of the pains. Thus it not unfrequently happens that they are feeble and ineffective in women of very weak constitution, or who have been much exhausted by debilitating disease. Cazeaux points out that the effects of such general conditions are often more than counterbalanced by flaccidity and want of resistance of the tissues, so that there is less obstacle to the passage of the child. Hence in phthisical patients, reduced to the last stage of exhaustion, the labour is not unfrequently surprisingly easy. Long residence in tropical climates has an unquestionable effect in causing uterine inertia, in consequence of the enfeebled nervous power it produces. It is a common observation that European residents in India are peculiarly apt to suffer from post-partum hæmorrhage from this cause. The general mode of life of patients has an unquestionable effect; and it is certain that deficient and irregular uterine action is more common in women of the higher ranks of society, who lead luxurious, enervating lives, than in women whose habits are of a more healthy character.

Constitution of the patient.

Influence of tropical climates.

Mode of life.

Tyler Smith lays much stress on frequent child-bearing as a cause of inertia, pointing out that a uterus which has been very frequently subjected to the changes connected with pregnancy, is unlikely to be in a typically normal condition. It is doubtful, however, whether the uterus of a perfectly healthy woman is affected in this way; certainly, if child-bearing have undermined her general health the labours are likely to be modified also.

Frequent child bearing.

Age has a decided effect. In the very young the pains are apt to be irregular, on account of imperfect development of the uterine muscle. Labour taking place for the first time in women advanced in life is also apt to be tedious, but not by any means so invariably as is generally believed. The apprehensions of the patient are often agreeably falsified, and where delay does occur, it is probably more often referable to rigidity and toughness of the parturient passages, than to feebleness of the pains.

Age of patient.

Morbid states of the primæ viæ frequently cause irregular, painful, and feeble contractions. A loaded state of the rectum has often a remarkable influence, as evidenced by the sudden and distinct change in the character of the labour

Disorders of the intestines.

Distended
bladder.

which often follows the use of suitable remedies. Undue distension of the bladder often acts in the same way, more especially in the second stage. When the urine has been allowed to accumulate unduly, the contraction of the accessory muscles of parturition often causes such intense suffering, by compressing the distended viscus, that the patient is absolutely unable to bear down. Hence the labour is carried on by uterine contractions alone, slowly, and at the expense of much suffering. A similar interference with the action of the accessory muscles is often produced by other causes. Thus if labour comes on when the patient is suffering from bronchitis or other chest disease, she may be quite unable to fix the chest by a deep inspiration, and the diaphragm and other respiratory muscles cannot act. In the same way the abdominal muscles may be prevented from acting when the abdomen is occupied by an ovarian tumour, or by ascitic fluid.

Bronchitis
and other
diseases
co-existing
with preg-
nancy.

Mental
emotions.

Mental conditions have a very marked effect. This is so common that it is familiar to the merest beginner in midwifery practice. The fact that the pains often diminish temporarily on the entrance of the accoucheur is known to every nurse; and so also undue excitement, the presence of too many people in the room, over-much talking, have often the same prejudicial effect. Depression of mind, as in unmarried women, and fear and despondency in women who have looked forward with apprehension to their labour, are also common causes of irregular and defective action.

Excessive
amount
of liquor
amni.

Undue distension of the uterus from an excessive amount of liquor amni not unfrequently retards the first stage, by preventing the uterus from contracting efficiently. When this exists, the pains are feeble and have little effect in dilating the cervix beyond a certain degree. This cause may be suspected, when undue protraction of the first stage is associated with an unusually large size and marked fluctuation of the uterine tumour, through which the foetal limbs cannot be made out on palpation. On vaginal examination, the lower segment of the uterus will be found to be very rounded and prominent, while the bag of membranes will not bulge through the os during the acme of the pain.

A somewhat similar cause is undue obliquity of the

uterus, which prevents the pains acting to the best mechanical advantage, and often retards the entry of the presenting part into the brim. The most common variety is anteversion, resulting from excessive laxity of the abdominal parietes, which is especially found in women who have borne many children. Sometimes this is so excessive that the fundus lies over the pubes, and even projects downwards towards the patient's knees. The consequence is that, when labour sets in, unless corrective means be taken, the pains force the head against the sacrum, instead of directing it into the axis of the pelvic inlet. Another common deviation is lateral obliquity; a certain degree of which exists in almost all cases, but sometimes it occurs to an excessive degree. Either of these states can readily be detected by palpation and vaginal examination combined. In the former the os may be so high up, and tilted so far backwards, that it may be at first difficult to reach it at all.

Malpositions of the uterus.

Besides being feeble, the uterine contractions, especially in the first stage, are often irregular and spasmodic, intensely painful, but producing little or no effect on the progress of the labour. This kind of case has been already alluded to in treating of the use of anæsthetics (vol. i. p. 344), and is very common in highly nervous and emotional women of the upper classes. Such irregular contractions do not necessarily depend on mental causes alone, and they are often produced by conditions producing irritation, such as loaded bowels, too early rupture of the membranes, and the like. Dr. Trenholme, of Montreal,¹ believes that such irregular pains most frequently depend on abnormal adhesions between the decidua and the uterine walls, which interfere with the proper dilatation of the os, and he has related some interesting cases in support of this theory.

Irregular and spasmodic pains.

The mere enumeration of these various causes of protracted labour will indicate the treatment required. Some of them, such as the constitutional state of the patient, age, or mental emotion, it is, of course, beyond the power of the practitioner to influence or modify; but in every case of feeble or irregular uterine action, a careful investigation should be made with the view of seeing if any removable

Treatment.

Of loaded
bowels.

Of excessive
amount of
liquor
amni :

Of adherent
membranes.

Of uterine
deviations.

Of temporary
exhaustion.

cause exist. For example, the effect of a large enema, when we suspect the existence of a loaded rectum, is often very remarkable ; the pains frequently almost immediately changing in character, and a previously lingering labour being rapidly terminated. Excessive distension of the uterus can only be treated by artificial evacuation of the liquor amni ; and after this is done, the character of the pains often rapidly changes.

If we have reason to suspect the existence of the morbid adhesions between the membranes and the uterine walls mentioned by Dr. Trenholme, an endeavour must be made to separate them by sweeping the finger or a flexible catheter round the internal margin of the os, or puncturing the sac. The former expedient has been advocated by Dr Inglis,¹ as a means of increasing the pains when the first stage is very tedious, and I have often practised it with marked success. Trenholme's observation affords a rationale of its action. The manœuvre itself is easily accomplished, and, provided the os be not very high in the pelvis, without any pain or discomfort to the patient.

Attention should always be paid to remedying any deviation of the uterus from its proper axis. If this be lateral, the proper course to pursue is to make the patient lie on the opposite side to that towards which the organ is pointing. In the more common anterior deviation the patient should lie on her back, so that the uterus may gravitate towards the spine, and a firm abdominal bandage should be applied. This prevents the organ from falling forwards, while its pressure stimulates the muscular fibres to increased action ; hence it is often very serviceable when the pains are feeble, even if there be no anteversion.

In a frequent class of cases, especially in the first stage, the pains diminish in force and frequency from fatigue, and the indication then is to give a temporary rest, after which they recommence with renewed vigour. Hence an opiate, such as 20 minims of Battley's solution, which often acts quickest when given in the form of enema, is frequently of the greatest possible value. If this secure a few hours' sleep, the patient will generally awake much

¹ *Sydenham Society's Year book*, 1869.

refreshed and invigorated. It is important to distinguish this variety of arrested pain from that dependent on actual exhaustion; and this can be done by attention to the general condition of the patient, and especially by observing that the uterus is soft and flaccid in the intervals between the pains, and that there is none of the tonic contraction, indicated by persistent hardness of the uterine parietes, the importance of which has been pointed out by Dr. Hicks. When the pains are irregular, spasmodic, and excessively painful, without producing any real effect, opiates are also of great service; and it is under these circumstances that chloral is especially valuable.

Importance of distinguishing between temporary and permanent exhaustion.

Still a large number of cases will arise in which the absence of all removable causes has been ascertained, and in which the pains are feeble and ineffective. We must now proceed to discuss their management. The fault being the want of sufficient contraction, the first indication is to increase the force of the pains. Here the so-called *oxytocic* remedies come into action; and, although a large number of these have been used from time to time, such as borax, cinnamon, and galvanism, practically, the only one in which any reliance is now placed is the ergot of rye. This has long been the favourite remedy for deficient uterine action, and it is undoubtedly a very powerful stimulant of the uterine fibres. It has, however, very serious disadvantages, which have been recognised by the ablest practitioners, and it is very questionable whether the risks to both mother and child do not more than counterbalance any advantages attending its use. The ergot is given in doses of 15 or 20 grains of the freshly powdered drug diffused in warm water, or in the more convenient form of the liquid extract, in doses of from 20 to 30 minims. In about fifteen minutes after its administration, the pains generally increase greatly in force and frequency, and if the head be low in the pelvis, and if the soft parts offer no resistance, the labour may be rapidly terminated.

Oxytocic remedies.

Ergot of rye.

Mode of administration.

Were its use always followed by this effect, there would be little or no objection to its administration. The pains, however, are different from those of natural labour, being strong, persistent, and constant. Its effect, indeed, is to produce that very state of tonic and persistent uterine con-

Objections to its use.

traction, which has been already pointed out as one of the chief dangers of protracted labour. Hence if, from any cause, the exhibition of the doses be *not* followed by rapid delivery, a condition is produced which is serious to the mother; and which experience has shown to be extremely perilous to the child, on account of the tonic contraction of the muscular fibres obstructing the utero-placental circulation. Dr. Hardy found that soon the foetal pulsations fall to 100, and, if delivery be long delayed, they commence to intermit. He also observed that when this occurred the child was always born dead; and found that the number of still-born children after ergot has been exhibited was very large, for out of 30 cases in which he gave it in tedious labour, only 10 of the children were born alive. Nor is its use by any means free from serious danger to the mother; a not inconsiderable number of cases of rupture of the uterus have been attributed to its incautious use. Hence, if it is to be given at all, it is obvious that it must be with strict limitations, and after careful consideration.

Limita-
tions to its
use.

The cardinal point to remember is that it is absolutely contra-indicated unless the absence of all obstacles to rapid delivery has been ascertained. Hence, it is only allowable when the first stage is over, and the os fully dilated, when the experience of former labours has proved the pelvis to be of ample size, and when the perinæum is soft and dilatable. Perhaps, as has been suggested, the administration of small doses of from 5 to 10 minims of the liquid extract every ten minutes, until more energetic action set in, might obviate some of these risks.

Manual
pressure as
a means of
increasing
the uterine
contrac-
tions.

If we had no other means of increasing defective uterine contractions at our disposal, and if the choice lay only between the use of ergot and instrumental delivery, there might not be so much objection to a cautious use of the drug in suitable cases. We have, however, a means of increasing the force of the uterine contractions so much more manageable and so much more resembling the natural process, that I believe it to be destined to entirely supersede the administration of ergot. This is the application of manual pressure to the uterus through the abdomen, an expedient that has of late years been much used in Germany, and has begun to be employed in English practice. I believe, therefore, that

ergot should be chiefly used for the purpose of exciting uterine contraction after delivery, when its peculiar property of promoting tonic contraction is so valuable, and that it should rarely, if at all, be employed before the birth of the child.

The systematic use of uterine pressure as an oxytotic was first prominently brought under the notice of the profession by Credè, under the name of 'Expressio Fœtus,' although it has been used in various forms from time immemorial.

There are some curious obstetric customs among various nations, which probably arose from a recognition of its value; as, for example, the mode of delivery adopted among the Kalmucks, where the patient sits at the foot of the bed, while a woman, seated behind her, seizes her round the waist and squeezes the uterus during the pains. Amongst the Japanese, Siamese, North American Indians, and many other nations, pressure, applied in various ways, is habitually used.

Its use
among va-
rious na-
tions.

Credè maintains that it is possible to effect the complete expulsion of the child by properly applied pressure, even when the pains are entirely absent. Strange as this may appear to those who are not familiar with the effects of pressure, I believe that, under exceptional circumstances, when the pelvis is very capacious and the soft parts offer but slight resistance, it can be done. I have delivered in this way a patient whose friends would not permit me to apply the forceps, when I could not recognise the existence of any uterine contraction at all, the fœtus being literally squeezed out of the uterus. It is not, however, as replacing absent pains, but as a means of intensifying and prolonging the effects of deficient and feeble ones, that pressure finds its best application.

If some
cases it is
possible to
expel the
child en-
tirely by
pressure.

Its effects are often very remarkable, especially in women of slight build, where there is but little adipose tissue in the abdominal walls, and not much resistance in the pelvic tissues. If the finger be placed on the head while pressure is applied to the uterus, a very marked descent can readily be felt, and not unfrequently two or three applications will force the head on to the perinæum. There are, however, certain conditions when it is inapplicable, and existence of which should contra-indicate its use. Thus if the uterus seems unusually tender on pressure, and, *a fortiori*, if the tonic contraction of exhaustion be present, it is inadmissible. So also

It is, how-
ever, as a
means of
intensify-
ing feeble
pains that
pressure is
valuable.

Circumstances contra-indicating the use of pressure. Cases most suited for its use.

Mode of application.

if there be any obstruction to rapid delivery, either from narrowing of the pelvis or rigidity of the soft parts, it should not be used. The cases suitable for its application are those in which the head or breech is in the pelvic cavity, and the delay is simply due to a want of sufficiently strong expulsive action.

It may be applied in two ways. The better is to place the patient on her back at the edge of the bed, and spread the palms of the hands on either side of the fundus and body of the uterus, and, when a pain commences, to make firm pressure during its continuance downwards and backwards in the direction of the pelvic inlet. As the contraction passes off the pressure is relaxed, and again resumed when a fresh pain begins. In this way each pain is greatly intensified, and its effect on the progress of the fetus much increased. It is not essential that the patient should lie on her back. A useful, although not so great, amount of pressure can be applied when she is lying in the ordinary obstetric position on her left side, the left hand being spread out over the fundus, leaving the right free to watch the progress of the presenting part per vaginam.

Special value of uterine pressure.

The special value of this method of treating ineffective pains is, that the amount and frequency of the pressure are completely within the control of the practitioner, and are capable of being regulated to a nicety in accordance with the requirements of each particular case. It has the peculiar advantage of closely imitating the natural means of delivery, and of being absolutely without risk to the child; nor is there any reason to think that it is capable of injuring the mother. At least I may safely say that, out of the large number of cases in which I have used it, I have never seen one in which I had the least reason to think that it had proved hurtful. Of course, it is essential not to use undue roughness; firm and even strong pressure may be employed, but that can be done without being rough; and, as its application is always intermittent, there is no time for it to inflict any injury on the uterine tissues.

Pressure may also be used when the pains are

Pressure is specially valuable, as has been said, when it is desirable to intensify feeble pains. It may, however, be serviceably employed when the pains are altogether absent to imitate and replace them, provided there be nothing but the

absence of a *vis à tergo* to prevent speedy delivery. In such cases an endeavour should be made to imitate the pains as closely as possible, by applying the pressure at intervals of four or five minutes, and entirely relaxing it after it has been applied for a few seconds.

altogether
absent.

When all these means fail we have then left the important resource of instrumental aid, and we have now to consider the indications for the use of the forceps under such circumstances. It has been already pointed out that professional opinion on this point has been undergoing a marked change; and that it is now recognised as an axiom by the most experienced teachers that, when we are once convinced that the natural efforts are failing, and are unlikely to effect delivery, except at the cost of long delay, it is far better to interfere soon rather than late, and thus prevent the occurrence of the serious symptoms accompanying protracted labour. This is, of course, a practice directly opposed to that so long taught in our standard works, in which instrumental interference was strictly prohibited unless all hope of natural delivery was at end; and in which the commencement at least, if not the complete establishment, of symptoms of exhaustion, was considered to be the only justification for the application of forceps in lingering labour.

Change of
professional
opinion
as to in-
strumental
delivery.

The reasons which have led the late distinguished Master of the Rotunda Hospital to a more frequent use of the forceps are so well expressed in his report for 1872, that I venture to quote them, as the best justification for a practice that many practitioners of the older school will, no doubt, be inclined to condemn as rash and hazardous. He says:¹ 'Our established rule is that so long as nature is able to effect its purpose without prejudice to the constitution of the patient, danger to the soft parts, or the life of the child, we are in duty bound to allow the labour to proceed; but as soon as we find the natural efforts are beginning to fail, and after having tried the milder means for relaxing the parts or stimulating the uterus to increased action, and the desired effects not being produced, we consider we are in duty bound to adopt still prompter measures, and by our timely assistance relieve the sufferer from her distress and her offspring from an

Views of
Dr. John-
ston on the
use of the
forceps.

¹ *Fourth Clinical Report of the Rotunda Lying-in Hospital for the year ending 1872.*

imminent death. Why, may I ask, should we permit a fellow creature to undergo hours of torture when we have the means of relieving them within our reach? Why should she be allowed to waste her strength, and incur the risks consequent upon long pressure of the head on the soft parts, the tendency to inflammation and sloughing, or the danger of rupture, not to speak of the poisonous miasm which emanates from an inflammatory state of the passages, the result of tedious labour, and which is one of the fertile causes of puerperal fever and all its direful effects, attributed by some to the influence of being confined in a large maternity, and not to its proper source, *i.e.* the labour being allowed to continue till inflammatory symptoms appear. The more we consider the benefits of timely interference, and the good results which follow it, the more are we induced to pursue the system we have adopted, and to inculcate to those we are instructing the advantages to be gained by such practice, both in saving the life of the child as well as securing the greater safety of the mother.' It would be impossible to put the matter in a stronger or a clearer light, and I feel confident that these views will be endorsed by all who have adopted the more modern practice.

Diminution of infantile mortality as an indication for early interference.

The great diminution of infantile mortality that accompanies a more frequent resort to the forceps is one of the strongest arguments in its favour, and one that has been little dwelt on. No one will deny that the practitioner owes a duty to the child as well as to the mother, although this fact has long been strangely overlooked. Taking all classes of labours together, 1 out of every 20 to 30 children is still-born. This is about the average proportion among those who leave the second stage as long as possible to the natural efforts; and, if we remember the continuous pressure to which the foetus is subjected when once it has passed through the os uteri, it is not astonishing that so many children should be lost during parturition. Nothing more convincingly shows the conservative effects of early interference as regards the child than the results of the practice of those who resort to it. Amongst the most remarkable statistics on this point are those contributed by Dr. Hamilton,¹ of Falkirk, whose papers are well worthy of study. That gentleman uses

¹ *Medico-Clin. Rev.* vols. xlviii. and xlix.

the forceps on an average once in every seventh or eighth case, and he thus delivered 731 successive children without a single still-birth, a result which he justly describes as altogether unprecedented in obstetric history.

It is, of course, right that we should consider the opposite point of view, and reflect on the possible disadvantages which may attend the timely interference advocated. Here I should point out that I am now talking only of the use of the forceps in simple inertia, when the head is low in the pelvic cavity, and when all that is wanted is a slight *vis à fronte* to supplement the deficient *vis à tergo*. The use of the instrument when the head is arrested high in the pelvis, or in cases of deformity, or before the os uteri is completely expanded, is an entirely different and much more serious matter, and does not enter into the present discussion. The facts just stated as regards the child put it beyond question, that—from that point of view at least—the dangers of delay are infinitely greater than those of action. It only then remains for us to enquire if there be sufficient risk to the mother to counterbalance that of delay? It will, of course, be conceded by all, that the forceps in the hands of a coarse, bungling, and ignorant practitioner, who has not studied the proper mode of operating, may easily inflict serious damage. The possibility of inflicting injury in this way should act as a warning to every obstetrician to make himself thoroughly acquainted with the proper mode of using the instrument, and to acquire the manual skill which practice and the study of the mechanism of delivery will alone give in perfection; but it can hardly be used as an argument against its use. If that were admitted, surgical interference of any kind would be tabooed, since there is none that ignorance and incapacity might not render dangerous.

Possible dangers attending the use of the forceps.

Assuming, therefore, that the practitioner is able to apply the forceps skilfully, is there any inherent danger in their use? I think all who dispassionately consider the question must admit that, in the class of cases alluded to, the operation is so simple that its disadvantages cannot for a moment be weighed against those attending protraction and its consequences. Against this conclusion statistics may possibly be quoted such as those of Churchill, who estimated that 1 in 20 mothers delivered by forceps in British practice were

lost. But the fallacy of such figures is apparent on the slightest consideration; and by no one has this been more conclusively shown than by Drs. Hicks and Phillips in their paper on tables of mortality after obstetric operations,¹ where it is proved in the clearest manner that such results are due not to the treatment, but rather to the fact that the treatment was so long delayed.

impossibility of laying down any definite rules for the use of the forceps.

It is quite impossible to lay down any precise rule as to when the forceps should be used in uterine inertia. Each case must be treated on its own merits, and after a careful estimate of the effect of the pains. The rules generally taught were, that the head should be allowed to rest at or near the perinæum for a number of hours, and that interference was contra-indicated if the slightest progress were being made. It is needless to say that both these rules are incompatible with the views I have been inculcating, and that any rule based upon the length of time the second stage of labour has lasted must necessarily be misleading. What has to be done, I conceive, is, to watch the progress of the case anxiously after the second stage has fairly commenced, and to be guided by an estimate of the advance that is being made and the character of the pains, bearing in mind that the risk to the mother, and still more to the child, increases seriously with each hour that elapses. If we find the progress slow and unsatisfactory, the pains flagging and insufficient, and incapable of being intensified by the means indicated, then, provided the head be low in the pelvis, it is better to assist at once by the forceps, rather than to wait until we are driven to do so by the state of the patient.

Precipitate labour less common than lingering.

Undue rapidity of labour is certainly more uncommon than its converse, but still it is by no means of unfrequent occurrence. Most obstetric works contain a formidable catalogue of evils that may attend it, such as rupture of the cervix, or even of the uterus itself, from the violence of the uterine action; laceration of the perinæum from the presenting part being driven through before dilatation has occurred; fainting from the sudden emptying of the uterus; hæmorrhage from the same cause. With regard to the child it is held that the pressure to which it is subjected, and

¹ *Obst. Trans.* vol. xiii.

sudden expulsion while the mother is in the erect position, may prove injurious. Without denying that these may possibly occur now and again, it is certain that in the majority of cases over-rapid labour is not attended with any evil effects.

Precipitate labour may generally be traced to one of two conditions, or to a combination of both: excessive force and rapidity of the pains, or unusual laxity and want of resistance of the soft parts. The precise causes inducing these it is difficult to estimate. In some cases the former may depend on an undue amount of nervous excitability, and the latter on the constitutional state of the patient tending to relaxation of the tissues.

Is only occasionally attended with bad results. Depends on either excessive pains or undue laxity of the soft parts. Its causes are not readily made out.

Whatever the cause, the extreme rapidity of labour is occasionally remarkable, and one strong pain may be sufficient to effect the expulsion of the child, with little or no preliminary warning. I have known a child to be expelled into the pan of a water-closet, the only previous indication of commencing labour being a slight griping pain, which led the mother to fancy that an action of the bowels was about to take place. More often there is what may be described as a storm of uterine contractions, one pain following the other with great intensity, until the foetus is expelled. The natural effect of this is to produce a great amount of alarm or nervous excitement, which of itself forms one of the worst results of this class of labour. It is under such circumstances that temporary mania occurs, produced by the intensity of the suffering, under which the patient may commit acts her responsibility for which may fairly be open to question.

Occasionally produces much mental excitement.

Little can be done in treating undue rapidity of labour. We can, to some extent, modify the intensity of the pains by urging the patient to refrain from voluntary efforts, and to open the glottis by crying out, so that the chest may no longer be a fixed point for muscular action. Opiates have been advised to control uterine action, but it is needless to point out that, in most cases, there is no time for them to take effect. Chloroform will often be found most valuable, from the rapidity with which it can be exhibited, and its power of diminishing uterine action, which forms one of its chief drawbacks in ordinary practice, will here prove of much service.

Little treatment is possible.

Chloroform is often of service.

CHAPTER X.

LABOUR OBSTRUCTED BY FAULTY CONDITION OF THE SOFT PARTS.

Rigidity of
the cervix
a frequent
cause of
protracted
labour.

Its causes.

ONE of the most frequent causes of delay in the first stage of labour is rigidity of the cervix uteri, which may depend on a variety of conditions. It is often produced by premature escape of the liquor amnii, in consequence of which the fluid wedge, which is nature's means of dilating the os, is destroyed, and the hard presenting part is consequently brought to bear directly upon the tissues of the cervix, which are thus unduly irritated, and thrown into a state of spasmodic contraction. At other times it may be due to constitutional peculiarities, among which there is none so common as a highly nervous and emotional temperament, which renders the patient peculiarly sensitive to her sufferings, and interferes with the harmonious action of the uterine fibres. The pains, in such cases, cause intense agony, are short and cramp-like in character, but have little or no effect in producing dilatation; the os often remaining for many hours without any appreciable alteration, its edges being thin and tightly stretched over the head. Less often, and this is generally met with in stout plethoric women, the edges of the os are thick and tough.

Its effects.

The effects of prolongation of labour from this cause will vary much under different circumstances. If the liquor amnii be prematurely evacuated, the presenting part presses directly upon the cervix, and the case is then practically the same as if the labour were in the second stage. Hence grave symptoms may soon develop themselves, and early interference may be imperatively demanded. If the membranes be unruptured, delay will be of comparatively little moment, and considerable time may elapse without serious detriment to either the mother or child.

The treatment will naturally vary much with the cause, and the state of the patient. In the majority of cases, especially if the membranes be still intact, patience and time are sufficient to overcome the obstacle; but it is often in the power of the accoucheur materially to aid dilatation by appropriate management. Sometimes nature overcomes the obstruction by lacerating the opposing structures, and cases are on record in which even a complete ring of the cervix has been torn off, and come away before the head.

Its treatment.

Many remedies have been recommended for the purpose of facilitating dilatation, some of which are no doubt capable of acting beneficially. Amongst those most frequently resorted to was venesection, which was long a favourite, and with it was generally associated the administration of nauseating doses of tartar emetic. Both these acted by producing temporary depression, under which the resistance of the soft parts was lessened. They probably answered best in cases in which there was a rigid and tough cervix; and they might prove serviceable, even yet, in stout plethoric women of robust frame. Practically, however, they are now seldom, if ever, employed, and other and less debilitating remedies are preferred. The agent, *par excellence*, which is most serviceable is chloral, which is of special value in the more common cases in which rigidity is associated with spasmodic contraction of the muscular fibres of the cervix. Two to three doses of 15 grains, repeated at intervals of twenty minutes, are often of almost magical efficacy, the pains becoming steady and regular, and the os gradually relaxing sufficiently to allow the passage of the head. The inhalation of chloroform acts much in the same way, but on the whole less satisfactorily, its effects being often too great; while the peculiar value of the chloral is its influence in promoting relaxation of the tissues, without interfering with the strength of the pains.

Venesection and tartar emetic.

The use of chloral and chloroform.

Various local means of treatment may be also advantageously used. One of those most commonly employed is the warm bath, which is much used in France. It is of unquestionable value where there is much rigidity, and may be used either as an entire bath, or as a hip bath, in which the patient sits from twenty minutes to half an hour. The objection is the fuss and excitement it causes, and, for this reason, it is an expedient seldom resorted to in this country. A similar

Local means of treatment.

effect is produced, and much more easily, by a douche of tepid water upon the cervix. This can be very easily administered, the pipe of a Higginson's syringe being guided up to the cervix by the index finger of the right hand, and a stream of water projected against it for five or ten minutes. Smearing the os with extract of belladonna is advised by continental authorities, but its effects are more than doubtful.

Artificial
dilatation.

Artificial dilatation of the cervix by the finger has often been recommended, and has been the subject of much discussion, especially in the Edinburgh school, where it was formerly commonly employed. It is capable of being very useful, but it may also do much injury when roughly and injudiciously used. The class of cases in which it is most serviceable are those in which the liquor amnii has been long evacuated, and in which the head, covered by the tightly stretched cervix, has descended low into the pelvic cavity. Under these circumstances, if the finger be passed gently within the os during a pain, and its margin pressed upwards and over the head, as it were, while the contraction lasts, the progress of the case may be materially facilitated. This manœuvre is somewhat similar to that which has been already spoken of, when the anterior lip of the cervix is caught between the head and the pubic bone, and, if properly performed, I believe it to be quite safe, and often of great value. It is not, however, well adapted for those cases in which the membranes are still intact, or in which the os remains undilated when the head is still high in the pelvis. When there is much delay under these conditions, and interference of some kind seems called for, the dilatation may be much assisted by the use of the caoutchouc dilators, described in the chapter on the induction of premature labour, which imitate nature's method of opening up the os, and also act as a direct stimulant to uterine contraction. But it should be remembered, that it is precisely in such cases that delay is least prejudicial. If, however, the os be excessively long in opening, its dilatation may be safely and efficiently promoted by passing within it, and distending with water, one of the smaller sized bags; and after this has been in position from ten to twenty minutes it may be removed, and a larger size substituted.

The use of
india-rub-
ber dila-
tors.

Every now and again we meet with cases in which the obstacle depends upon some organic changes in the cervix, the most common of which are cicatricial hardening from former lacerations; hypertrophic elongation of the cervix from disease antecedent to pregnancy; or even agglutination and closure of the os uteri. Cicatrices are generally the result of lacerations during former labours. They implicate a portion only of the cervix, which they render hard, rigid, and undilatable, while the remainder has its normal softness. They can readily be made out by the examining finger. A somewhat similar, but much more formidable, obstruction is occasionally met with in cases of old standing hypertrophic elongation of the cervix, which is generally associated with prolapse. In most cases of this kind the cervix becomes softened during pregnancy, so that dilatation occurs without any unusual difficulty. But this is not always the case. A good example is related by Mr. Roper, in the seventh volume of the 'Obstetrical Transactions,' in which such a cervix formed an almost insuperable obstacle to the passage of the child.

Rigidity depending upon organic causes.

Cicatrices.

Hypertrophic elongation of the cervix.

Another mechanical obstacle is carcinoma of the cervix uteri, which produces extensive thickening and induration of its tissues; and the numerous examples of this kind recorded prove that even advanced malignant disease of the uterus is no bar to conception.

Carcinoma.

Agglutination of the margins of the os uteri is occasionally met with, and must, of course, have occurred after conception, which otherwise would have been impossible. This is generally the result of some inflammatory affection of the cervix during the early months of gestation, and I have known it recur in the same woman in two successive pregnancies. Usually it is not associated with any hardness or rigidity, but the entire cervix is stretched over the presenting part, and forms a smooth covering, in which the os may only exist as a small dimple, and may be very difficult to detect at all.

Occlusion of the os.

Any of these mechanical causes of rigidity may at first be treated in the same way as the more simple cases; and with patience, the use of chloral and chloroform, and of the fluid dilators, sufficient expansion to permit the

Their treatment

passage of the head will often take place. But if these methods produce no effect, and symptoms of constitutional irritation are beginning to develop themselves, other, and more radical, means of overcoming the obstruction may be imperatively required.

Incision of
the cervix.

Mode of
operation.

Under such circumstances incision of the cervix may be not only justifiable but essential, and it frequently answers extremely well. On the Continent it is resorted to much more frequently and earlier than in this country, and with the most beneficial results. The operation offers no difficulties. The simplest way of performing it is to guard the greater portion of the blade of a straight blunt-pointed bistoury by wrapping lint or adhesive plaster round it, leaving about half an inch of cutting edge towards its point. This is guided to the cervix, on the under surface of the index finger, and three or four notches are cut in the circumference of the os to about the depth of a quarter of an inch. Very generally, especially when the obstruction is only due to old cicatrices, the pains will now speedily effect complete expansion, which may be very advantageously aided by applying the hydrostatic dilators. When the obstruction is due to carcinomatous infiltration or inflammatory thickening, the case is much more complicated, and will painfully tax the resources of the accoucheur. Still there can be no question that incisions should form a preliminary to any subsequent proceedings that may be necessary, as they are, at the worst, not likely to increase in the least the risks the patient has to run, and they may possibly avert more serious operations. In the case of malignant disease the risk of serious hæmorrhage, from the great vascularity of the tissues, must not be forgotten, and, if necessary, means must be taken to check this by local styptics, such as perchloride of iron. If incision fail, and the state of the patient demands speedy delivery, it may be necessary to reduce the bulk of the child by perforation, or, in the worst cases of malignant infiltration, even to resort to the Cæsarean section.

Applica-
tion of the
forceps
within the
cervix.

Before performing craniotomy, when the os is sufficiently open to admit the blades, a cautious application of the forceps is quite justifiable. Steady and careful downward traction, combined with digital expansion, has often enabled a head to pass with safety through an os that has resisted all

other means of dilatation, and the destruction of the child has thus been avoided. If, indeed, the os appear to be dilatable, this procedure may advantageously be adopted before incision, and, as a matter of fact, it is commonly practised in the Rotunda Hospital. An operation involving, beyond doubt, of itself some risk, and requiring considerable operative dexterity, would naturally not be lightly and inconsiderately undertaken. But when it is remembered that the alternative is the destruction of the child, the risk of exhaustion, and at least as great mechanical injury to the mother, its difficulty need not stand in the way of its adoption.

When the os is apparently obliterated, incision is the only resource. Before resorting to it the patient should be placed under chloroform, and the entire lower segment of the uterus carefully explored. Possibly the aperture may be found high up, and out of reach of an ordinary examination, or we may detect a depression corresponding to its site. A small crucial incision may then be made at the site of the os, if this can be ascertained; if not, at the most prominent portion of the cervix. Very generally the pains will then suffice to complete expansion, which may be further aided by the fluid dilators.

Treatment when occlusion of the os exists.

Extreme rigidity of the vagina, or bands and cicatrices in or across its walls, the result of injuries in former labours, or of antecedent disease, occasionally obstruct the second stage. There is seldom any really formidable difficulty from this cause, since the obstruction almost always yields to the pressure of the presenting part. If there be any considerable extent of cicatrices in the vagina, artificial assistance may be required. If we should be aware of their existence during pregnancy, and find them to be sufficiently dense and extensive to be likely to interfere with delivery, an endeavour may be made to dilate them gradually by hydrostatic bags or bougies. If they be not detected until labour is in progress, we must be guided in our procedures by the pressure to which they are subjected. It may then be necessary to divide them with a knife, and to hasten the passage of the head by the forceps, so as to prevent contusion as much as possible. It is obviously impossible to lay down any positive rules for such rare con-

Bands and cicatrices in the vagina.

tingencies, the treatment suitable for which must necessarily vary much with the individual peculiarities of the case.

Extreme rigidity of the perineum.

Extreme rigidity of the perineum is often dependent upon cicatricial hardening from injury in previous labours. This may greatly interfere with its dilatation; and if laceration seem inevitable, we may be quite justified in attempting to avert it by incision of the margins of the perineum, on the principle of a clear cut being always preferable to a jagged tear.

Labour complicated with tumour.

Occasionally, we meet with very formidable obstacles from tumours connected with the maternal structures. These are most commonly either fibroid or ovarian, although others may be met with, such as malignant growths from the pelvic bones, exostoses, &c.

Fibroid tumours of the uterus.

Considering the frequency with which women suffer from fibroid tumours of the uterus, it is perhaps somewhat remarkable that they do not more often complicate delivery. Probably women so affected are not apt to conceive. Occasionally, however, cases of this kind cause much anxiety. Of course, the cases are most grave in which the tumours are so situated as to encroach upon the cavity of the pelvis, and mechanically obstruct the passage of the child. Even those in which this does not occur are by no means free from danger, for interstitial and sub-peritoneal fibroids, situated in the upper parts of the uterus, and leaving the pelvic cavity quite unimplicated, may interfere with the action of the uterine fibres, prevent subsequent contraction, cause profuse post-partum hæmorrhage, or even predispose to rupture of the uterine tissue. Hence, every case in which the existence of uterine fibroids has been ascertained must be anxiously watched. The risk of hæmorrhage is perhaps the greatest; for, if the tumours be at all large, efficient contraction of the uterus after the birth of the child must be more or less interfered with. It does not, however, necessarily ensue. I recently saw an interesting example of this in a patient, whose case was looked forward to with much anxiety, in consequence of the existence of several enormous fibroid masses projecting from the fundus and anterior surface of the body of the uterus, and whose labour was, nevertheless, typically normal in every way. Should hæmorrhage occur after delivery, the injection of styptic

They are most likely to prove dangerous when encroaching on the pelvic cavity.

tions would probably be peculiarly valuable, since the ordinary means of promoting contraction are likely to fail.

It is when the fibroid growths implicate the lower uterine zone and the cervical region, that the greatest difficulties are likely to be met with. The practice then to be adopted must be regulated to a great extent by the nature of each individual case. If it be possible to push the tumour above the pelvic brim, out of the way of the presenting part, that, no doubt, is the best course to pursue, as not only clearing the passage in the most effectual way, but removing the tumour from the bruising to which it would otherwise be subjected when pressed between the head and the pelvic walls, which seems to be one of the greatest dangers of this complication. This manœuvre is sometimes possible in what seem to be the most unpromising circumstances. An interesting example of this is narrated by Mr. Spencer Wells,¹ who, called to perform the Cæsarean section, succeeded, although not without much difficulty, in pushing the obstructing mass above the brim, the child subsequently passing with ease.

Reposition
of the tu-
mour.

Failing this, the possibility of enucleating the tumour, or, if that be not possible, of removing it piecemeal with the ecraseur, should be carefully considered. On account of the loose attachments of these growths, and the facility with which they can be removed in this way in the non-pregnant state, the expedient seems certainly well worthy of a trial, if their site and attachments render it at all feasible. Interesting examples of the successful performance of this operation are recorded by Danyau and Braxton Hicks. Should it be found impracticable, the case must be managed in reference to the amount of obstruction; and the forceps, craniotomy, and even the Cæsarean section, may be necessary.

Enuclea-
tion or
ablation.

The next most common class of obstructing tumours are those of the ovary (fig. 115), and it is apparently not the larger of these which are most apt to descend into the pelvic cavity. When the tumour is of any considerable size, its bulk is such that it cannot be contained in the true pelvis, and it rises into the abdominal cavity with the uterus. Hence, the existence of the tumour that offers the most for-

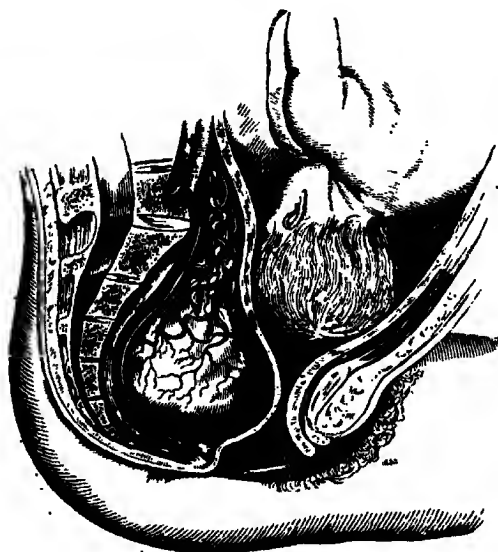
Tumours of
the ovary.

¹ *Obstet. Trans.* vol. ix. p. 73.

midable obstacle to delivery is rarely suspected before labour sets in.

In order to estimate the results of the various methods of treatment, I have tabulated 57 cases.¹ In 13 labour was terminated by the natural powers alone; but of these 6 mothers, or nearly one-half, died. In favourable contrast with these we have the cases in which the size of the tumour was diminished by puncture. These are 9 in number, in all of which the mothers recovered; 6 out of the 9 children being

Fig. 116.



LABOUR COMPLICATED BY OVARIAN TUMOUR.

saved. The reason of the great mortality in the former cases is apparently the bruising to which the tumour, even when small enough to allow the child to be squeezed past it, is necessarily subjected. This is extremely apt to set up a fatal form of diffuse inflammation, the risk of which was long ago pointed out by Ashwell,² who draws a comparison between cases in which such tumours have been subjected to contusion and cases of strangulated hernia; and the cause of death in both is doubtless very similar. This danger is avoided when the tumour is punctured, so as to become flattened between the head and the pelvic walls. On this account, I think, it

Puncture
of the ob-
structing
tumour.

¹ *Obstet. Trans.* vol. ix.

² *Guy's Hospital Reports*, vol. ii.

should be laid down as a rule that puncture should be performed in all cases of ovarian tumour engaged in front of the presenting part, even when it is of so small a size as not to preclude the possibility of delivery by the natural powers.

should
always be
performed.

In 5 of the 57 cases it was found possible to return the tumour above the pelvic brim, and in these also the termination was very favourable, all the mothers recovering. Should puncture not succeed, and it may fail on account of the gelatinous and semi-solid nature of the contents of the cyst, it may be possible to dispose of the tumour in this way, even when it seems to be firmly wedged down in front of the presenting part, and to be hopelessly fixed in its unfavourable position.

Treatment
when puncture fails.

Failing either of these resources, it may be necessary to resort to craniotomy, provided the size of the tumour precludes the possibility of delivery by forceps.

The question of the effect on labour of ovarian tumour which does not obstruct the pelvic canal is one of some interest, but there are not a sufficient number of cases recorded to throw much light on it. I am disposed to think that labour generally goes on favourably. What delay there is depends on the inefficient action of the accessory muscles engaged in parturition, on account of the extreme distension of the abdomen.

There are a few other conditions, connected with the maternal structures, which may impede delivery, but which are of comparatively rare occurrence. Amongst them is vaginal cystocele, consisting of a prolapse of the distended bladder in front of the presentation, where it forms a tense fluctuating pouch, which has been mistaken for an hydrocephalic head, or for the bag of membranes. This complication is only likely to arise when the bladder has been allowed to become unduly distended from want of attention to the voiding of urine during labour. The diagnosis should not offer any difficulty, for the finger will be able to pass behind, but not in front of, the swelling, and reach the presenting part; while the pain and tenesmus will further put the practitioner on his guard. The treatment consists in emptying the bladder; but there may be some difficulty in passing the catheter in consequence of the urethra being dragged out of

Vaginal
cystocele.

its natural direction. A long elastic male catheter will almost always pass, if used with care and gentleness. Should it be found impossible to draw off the water, and this is said to have sometimes happened, the tense pouch might be punctured without danger by the fine needle of an aspirator trocar, and its contents withdrawn. When once the viscus is emptied, it can easily be pushed above the presenting part in the intervals between the pains.

Vesical calculus.

In some few cases difficulties have arisen from the existence of a vesical calculus. Should this be pushed down in front of the head, it can readily be understood that the maternal structures would run the risk of being seriously bruised and injured. Should we make out the existence of a calculus—and, if the presence of one be suspected, the diagnosis could easily be made by means of a sound—an endeavour should be made to push it above the brim of the pelvis. If that be found to be impossible, no resource is left but its removal, either by crushing, or by rapid dilatation of the urethra, followed by extraction. Should we be aware of the existence of a calculus during pregnancy, its removal should certainly be undertaken before labour sets in.

Hernial protrusion.

Hernial protrusion in Douglas's space may sometimes give rise to anxiety from the pressure and contusion to which it is necessarily subjected. An endeavour must be made to replace it, and to moderate the straining efforts of the patient; and it may be even advisable to apply the forceps so as to relieve the mass from pressure as soon as possible. This complication, however, is of great rarity.

Scybalous masses in the rectum.

Scybalous masses in the intestine may be so hard and impacted as to form an obstruction. The necessity of attending to the state of the rectum has already been pointed out. Should it be found impossible to empty the bowel by large enemata, the mass must be mechanically broken down and removed by the scoop.

Edema of the vulva.

Excessive cedematous infiltration of the vulva may sometimes cause obstruction, and require diminution in size, which can be easily effected by numerous small punctures.

Hæmatic effusions in connection with labour.

Hæmatic effusions into the cellular tissue of the vulva or vagina form a grave complication of labour. Such blood swellings are most usually met with in one or both labia, or under the vaginal wall; in the gravest forms, the blood

may extend into the tissues for a considerable distance, as in the case recorded by Cazeaux, where it reached upwards as far as the umbilicus in front, and as far as the attachment of the diaphragm behind.

The conditions associated with pregnancy, the distension and engorgement to which the vessels are subjected, the interference with the return of the blood by the pressure of the head during labour, and the violent efforts of the patient, afford a ready explanation of the reason why a vessel may be predisposed to rupture and admit of the extravasation of blood.

Conditions
favouring
the acci-
dent.

The accident is fortunately far from a common one, although a sufficient number of cases are recorded to make us familiar with its symptoms and risks. The dangers attending such effusions would seem to be great, if the statistics given by those who have written on the subject are to be trusted. Thus, out of 124 cases collected by various French authors, 44 proved fatal. Dr. Fordyce Barker points out that, since the nature and appropriate treatment of the accident have been more thoroughly understood, the mortality has been much lessened; for out of 15 cases reported by Scanzoni only 1 died, and out of 22 cases he had himself seen 2 died, and all these 3 deaths were from puerperal fever, and not the direct result of the accident.¹

Its dangers
are con-
siderable.

The blood may be effused into any part of the pelvic cellular tissue, or into the labia. The accident most often happens during labour when the head is low down in the pelvis, not infrequently just as it is about to escape from the vulva. Hence the extravasation is more often met with low down in the vagina, and more frequently in one of the labia than in any other situation. I have met with a case where I had every reason to believe that an extravasation of blood had occurred within the tissues immediately surrounding the cervix. It is natural to suppose that a varicose condition of the veins about the vulva would predispose to the accident, but in most of the recorded examples this is not stated to have been the case. Still, if varicose veins exist to any marked degree, some anxiety on this point cannot but be felt.

Situation
of the
blood effu-
sions.

¹ *The Puerperal Diseases*, p. 60.

Time of occurrence.

The thrombus occasionally, though rarely, forms before delivery. Most commonly it first forms towards the end of labour, or even after the birth of the child. In the latter case it is probable that the laceration in the vessels occurred before the birth of the child, and that the pressure of the presenting part prevented the escape of any quantity of blood at the time.

Its symptoms.

The symptoms are not by any means characteristic. Pain of a tearing character, occasionally very intense, and extending to the back and down the thighs, is very generally associated with the formation of the thrombus. If a careful physical examination be made, the nature of the case can readily be detected. When the blood escapes into the labium, a firm, hard swelling is felt, which has even been mistaken for the foetal head. If the effusion implicate the internal parts only, the diagnosis may not at first be so evident. But even then a little care should prevent any mistake, for the swelling may be felt in the vagina, and may even form an obstacle to the passage of the child. Cazeaux mentions cases in which it was so extensive as to compress the rectum and urethra, and even to prevent the exit of the lochia. In some cases the distension of the tissues is so great that they lacerate, and then hæmorrhage, sometimes so profuse as directly to imperil the life of the patient, may occur. The bursting of the skin may take place some time subsequent to the formation of the thrombus. Constitutional symptoms, of course, will be in proportion to the amount of blood lost, either by extravasation, or externally, after the rupture of the superficial tissues. Occasionally they are considerable, and are the same as those which are familiar to us in connection with hæmorrhage from any cause.

Spontaneous laceration.

Its termination.

The terminations of thrombus are either spontaneous absorption, which may occur if the amount of blood extravasated be small; or the tumour may burst, and then we have external hæmorrhage; or it may suppurate, the contained coagula being discharged from the cavity of the cyst; and finally, sloughing of the superficial tissues has occurred.

Treatment.

The treatment must naturally vary with the size of the thrombus, and the time at which it forms. If it be met with during labour, unless it be extremely small, it will be very apt to form an obstruction to the passage of the child.

Under the circumstances it is clearly advisable to terminate the labour as soon as possible, so as to remove the obstacle to the circulation in the vessels. For this purpose the forceps should be applied as soon as the head can be easily reached. If the tumour itself obstruct the passage of the head, or if it be of any considerable size, it will be necessary to incise it freely at its most prominent point and turn out the coagula, controlling the hæmorrhage at once by filling the cavity with cotton wadding saturated in a solution of perchloride of iron, while, at the same time, digital compression with the tips of the fingers is kept up. By this means pressure is applied directly to the bleeding point, and the hæmorrhage can be controlled without difficulty. This is all the more necessary if spontaneous rupture have taken place, for then the loss of blood is often profuse, and it is of the utmost importance to reach the site of the hæmorrhage as nearly as possible.

Its treatment when formed during labour.

If the thrombus be not so large as to obstruct delivery, or if it be not detected until after the birth of the child, the question arises whether the case should not be left alone, in the hope that nature may effect absorption, as in most cases of pelvic hæmatocele. This expectant treatment is advised by Cazeaux, and it seems to be the most rational plan we can adopt. True it may take a longer time for the patient to convalesce completely than if the coagula were removed at once, and the hæmorrhage restrained by pressure on the bleeding point; but this disadvantage is more than counterbalanced by the absence of risk from hæmorrhage, and of septicæmia from the suppuration that must necessarily follow. Softening and suppuration may, in many cases, occur in a few days, necessitating operation, but the vessels will then be probably occluded, and the risk of hemorrhage much lessened. Dr. Barker, however, holds the opposite opinion, and thinks that the proper plan is to open the thrombus early, controlling the hæmorrhage in the manner already indicated, unless the thrombus is situated high in the vaginal canal.

Treatment when the thrombus is small or forms after delivery.

Whenever the cavity of a thrombus has been opened, either by incision, or by spontaneous softening at some time subsequent to its formation, it must not be forgotten that there is considerable risk from septic absorption. To avoid

Risk of subsequent septicæmia.

this, care must be taken to use antiseptic dressings freely, such as the glycerine of carbolic acid applied directly to the part, and frequent vaginal injections of diluted Condyl's fluid. Barker lays special stress on the importance of not removing prematurely the coagula formed by the styptic applications, for fear of secondary hæmorrhage, but of allowing them to come away spontaneously.

CHAPTER XI.

DIFFICULT LABOUR DEPENDING ON SOME UNUSUAL CONDITION
OF THE FŒTUS.

THE subject of multiple pregnancy in general having already been fully considered, we have now only to discuss its practical bearing as regards labour. Fortunately the existence of twins rarely gives rise to any serious difficulty. In the large proportion of cases the presence of a second fœtus is not suspected until the birth of the first is completed, when the nature of the case is at once apparent from the fact of the uterus remaining as large, or nearly as large, as it was before.

Plural births.

There may possibly be some delay in the birth of the first child, inasmuch as the extreme distension of the uterus may interfere with its thoroughly efficient action; while, in addition, the uterine pressure is not directly conveyed to the ovum as in single births, but indirectly through the amniotic sac of the second child (fig. 117). Such delay is especially apt to arise when the first child presents by the breech, for, even if the body be expelled spontaneously, difficulty is likely to occur with the head, since the uterus does not contract upon it as is ordinarily the case. Hence the intervention of the accoucheur to save the life of the child, by the extraction of the head, will be almost a matter of necessity.

The presence of a second fœtus is rarely suspected until after the birth of the first.

The uterus acts at a disadvantage.

In the majority of cases, after the birth of the first child, there is a temporary lull in the pains, which soon recommence, generally in from ten to twenty minutes, and the second child is rapidly expelled; for, on account of the full dilatation of the soft parts, there is no obstacle to its delivery. Sometimes there is a considerable interval before pains recur, and instances are recorded in which even several days have elapsed between the births of the two children.

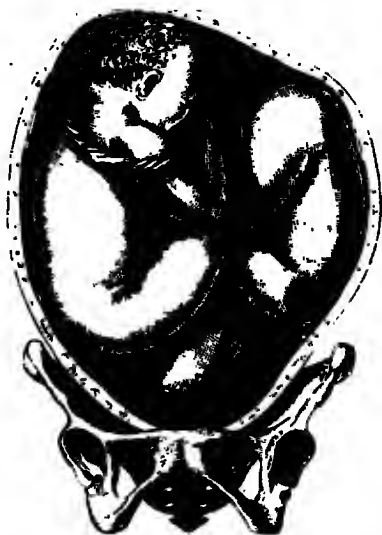
In most cases the management of twin does not differ from that of ordinary labour. As soon as we are cer-

Treatment.

tain of the existence of a second foetus, we should inform the bystanders, but not necessarily the mother, to whom the news might prove an unpleasant and even dangerous shock. Then, having taken care to tie the cord of the first child for fear of vascular communication between the placenta, our duty is to wait for the recurrence of pains. If these come on rapidly, and the presentation of the second foetus be normal, its birth is managed in the usual way.

If there be any unusual delay, we have to consider

Fig. 117.



TWIN PREGNANCY, BREECH AND HEAD PRESENTING.

Management when there is delay after the birth of the first child.

Necessity of preventing uterine inertia.

the proper course to pursue, and on this the opinions of authorities differ greatly. Some advise a delay of several hours, and even more, if pains do not recur spontaneously; while others, Murphy for example, recommend that the second child should be delivered at once. Either extreme of practice is probably wrong, and the safest and best course is, doubtless, the medium one. The special point to bear in mind is, that, in multiple pregnancy, on account of the extreme distension of the uterus, there is a tendency to inertia, and consequently to post-partum hæmorrhage; and that, therefore, it is better that the birth of the second child should be delayed, even for a considerable time, rather than that the patient should run the risk attending an empty and

uncontracted uterus. If, however, uterine action be present, there is an obvious advantage in the delivery of the second child before the dilatation of the passages passes off.

The best plan would seem to be, if, after waiting a quarter of an hour, labour pains do not recur, to try and induce them by uterine friction and pressure, and by the administration of a dose of ergot, to which, as there can be no obstacle to the rapid birth of the second child, there can be now no objection. The membranes of the second child should always be ruptured at once, if easily within reach, as one of the speediest means of inducing contraction. If no progress be made, and speedy delivery be indicated—a necessity which may arise either from the exhausted state of the patient, the presence of hæmorrhage, extremely feeble pulsations of the foetal heart (showing that the life of the second child is endangered), or malpresentation of the second foetus—turning is probably the readiest and safest expedient. Under such circumstances the operation is performed with great ease, since the passages are all amply dilated. After bringing down the feet, the birth of the body should be slowly effected, with the view of ensuring as complete subsequent contraction as possible. If the head has descended into the pelvis, of course turning is impossible, and the forceps must be applied.

Endea-
vours
should be
made to
excite ute-
rine ac-
tion.

Rapture of
mem-
branes of
second
child.

Turning is
generally
the best
expedient
if speedy
delivery be
indicated.

Occasionally very serious difficulties arise from parts of both foetuses presenting simultaneously, and, either thus impeding the entrance of either child into the pelvis, or getting locked together, so as to render delivery impossible without artificial aid. Such difficulties are not apt to arise in the more ordinary cases, in which each child has its own bag of membranes, since then the foetuses are kept entirely separate; but in those in which the twins are contained in a common amniotic cavity, or in which both sacs have burst simultaneously. They are very puzzling to the obstetrician, and it may be far from easy to discover the cause of the obstruction. Nor is it possible to lay down any positive rules for their manage-ment, which must be governed, to a considerable extent, by the circumstances of each individual case.

Difficulties
arising
from 'lock-
ed twins.'

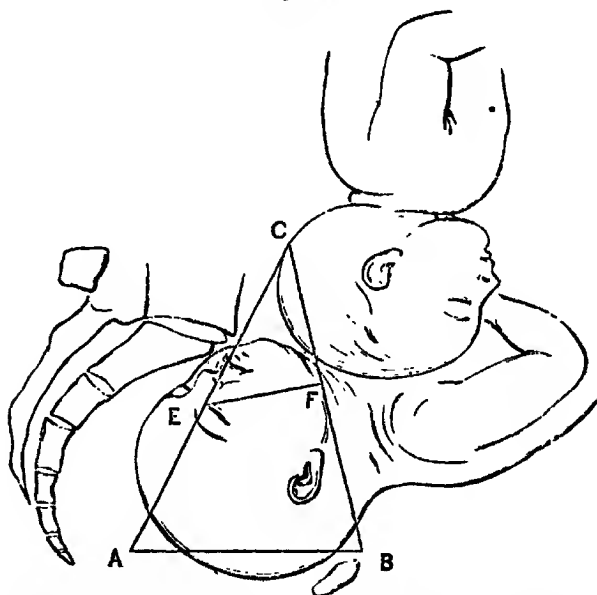
These
chiefly
arise when
the twins
have a
common
amnion.

Sometimes both heads present simultaneously at the brim, and then neither can enter unless they be unusu-

Nature of
these cases.

ally small or the pelvis very capacious, when both may descend; or rather the first head may descend low into the pelvic cavity, and then the second head enters the brim, and gets jammed against the thorax of the first child (fig. 118). Reiman¹ relates a curious example of this, in which he delivered the first head with the forceps, but found the body would not follow, and, on examination, a second head was found in the pelvis. He then applied the forceps to the second head; the body of the first child was then born,

Fig. 118.



SHOWS HEAD-LOCKING, BOTH CHILDREN PRESENTING HEAD FIRST.

and afterwards that of the second. ° Such a mechanism must clearly have been impossible unless the pelvis had been extremely large.

Both heads
presenting
simultane-
ously.

Whenever both heads are felt at the brim, it will generally be found possible to get one out of the way by appropriate manipulation, one hand being passed into the vagina, the other aiding its action from without. Then the forceps may be applied to the other head, so as to engage it at once in the pelvic cavity. If both have actually passed into the pelvis, as in the case just alluded to, the difficulty will be much greater. It will generally be easier to push

¹ *Arch. f. Gynak*, 1871.

up the second head, while the lower is drawn out by the forceps, than to deliver the second, leaving the first *in situ*.

In other cases a foot or a hand may descend along with the head, and even the four feet may present simultaneously. The rule, in the former, case is to push the part descending with the head out of the way, and, in the latter, to disengage one child as soon as possible. Great care is necessary, or we might possibly bring down the limbs of separate children.

Foot or hand with head.

The most common kind of difficulty is, when the first child presents by the breech, and is delivered as far as the head, which is then found to be locked with the head of the second child, which has descended into the pelvic cavity (fig. 119).

Two heads interlocking in head and breech presentations.

Here it is clear that the obstruction must be very great, and, unless the children are extremely small, insuperable. The first endeavour should be to disentangle the heads; this is sometimes feasible if the second be not deeply engaged in the pelvis, and the hand be passed up so as to push it out of the way. This will but rarely succeed; then it may be possible to apply the forceps to the second head and drag it past the body of the first child; but generally the sacrifice of one of the children is essential. As the body of the first child must have been born for some time, it is probable that the pressure to which it has been subjected will have already imperilled, if it have not destroyed, its life, and therefore the plan usually recommended is to decapitate. This can easily be done with scissors or a wire ecraseur, after which the second child is expelled without difficulty, leaving the head of the first in utero to be subsequently dealt with. Or the head which is lowest may be perforated behind the right ear or through the mouth, and subsequently crushed with the cephalotribe.

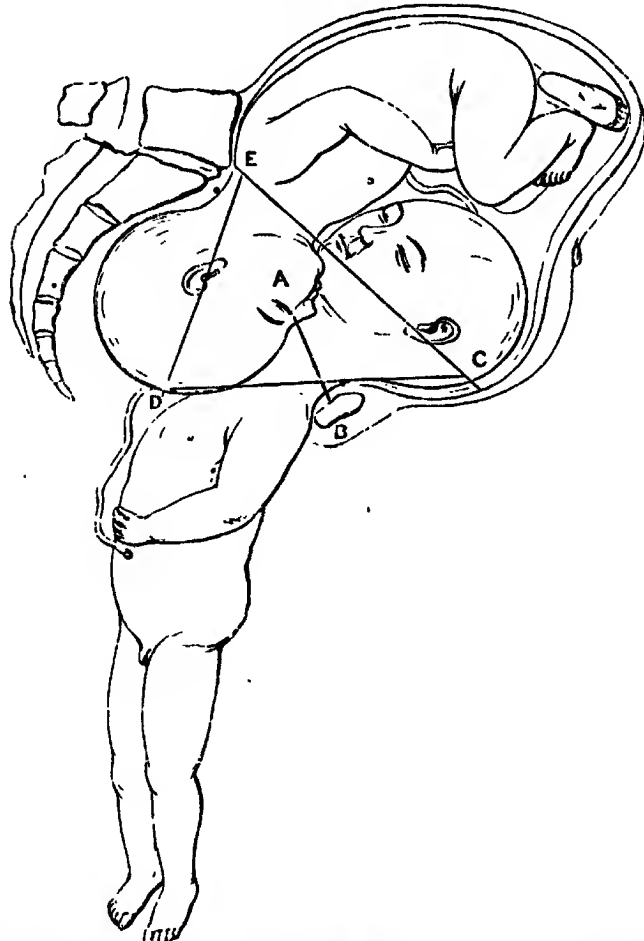
Another mode of managing these cases is, to perforate the upper head, and draw it past the lower with the cephalotribe or craniotomy forceps. This plan has the disadvantage of probably sacrificing both children, since the first child can hardly survive the pressure and delay, whereas the former gives the second child a fair chance of being born alive.

In connection with the subject of twin labour we may

Conjoined
twins.

consider those rare cases in which the bodies of the foetuses are partially fused together. The mechanism and management of delivery in cases of double monstrosity have attracted comparatively little attention, no doubt because authors have considered them matters of curiosity merely, rather than of practical importance.

Fig. 119.



SHOWS HEAD-LOCKING, FIRST CHILD COMING FEET FIRST; IMPACTION OF HEADS FROM WEDGING IN BRIM.

D. Apex of wedge. E, C. Base of wedge which cannot enter brim. A, B. Line of decapitation to decompose wedge, and enable head of second child to pass.

The frequent occurrence of such monstrosities in our museums, and the numerous cases scattered through our periodical literature, are sufficient to show that they are not so very rare as we might be inclined to imagine; and, as

they are likely to give rise to formidable difficulties in delivery, it cannot be unimportant to have a clear idea of the usual course taken by nature in effecting such births, with the view of enabling us to assist in the most satisfactory manner should a similar case come under our observation.

Unfortunately the authors who have placed on record the birth of double monsters have generally occupied themselves more with a description of the structural peculiarities of the fœtuses, than with the mechanism of their delivery; so that, although the cases to be met with in medical literature are very numerous, comparatively few of them are of real value from an obstetric point of view. Still, I have been able to collect the details of a considerable number in which the history¹ of the labour is more or less accurately described; and doubtless a more extensive research would increase the list.

For obstetric purposes we may confine our attention to four principal varieties of double monstrosity, which are met with far more frequently than any others. These are:—

Double monstrosity may be divided into four classes.

A. Two nearly separate bodies united in front, to a varying extent, by the thorax or abdomen.

B. Two nearly separate bodies united back to back by the sacrum and lower part of the spinal column.

C. Dicephalous monsters, the bodies being single below, but the heads separate.

D. The bodies separate below, but the heads fixed or partially united.

This classification by no means includes all the varieties of monsters that we may meet with. It does, however, include all that are likely to give rise to much difficulty in delivery; and all the cases I have collected may be placed under one of these divisions.

The first point that strikes us in looking over the history of these deliveries is the frequency with which they have been terminated by the natural powers alone, without any assistance on the part of the accoucheur. Thus, out of the 31 cases no less than 20 were delivered naturally, and apparently without much trouble. Nothing can better show the wonderful resources of nature in overcoming difficulties of a very formidable kind.

In a large number of cases delivery is effected by the natural powers.

¹ *Obstet. Trans.* vol. viii.

It is pretty generally assumed by authors that the children are necessarily premature, and, therefore, of small size, and that delivery before the full term is rather the rule than the exception. Dugés states that the children are often dead, and that putrefaction has taken place, which facilitates their expulsion. Both these assumptions seem to me to have been made without sufficient authority, and not to be borne out by the recorded facts. In only 1 of the 31 cases is it mentioned that the children were premature; nor is there any sufficient reason that I can see why labour should commence before the full term of gestation.

Class A.

By far the greatest number are included in the first class—that in which the bodies are nearly separate, but united by some part of the thorax or abdomen. This is the division which includes the celebrated Siamese Twins, an account of whose birth, I may observe, I have not been able to discover. Out of the 31 cases, 19 come under this heading. The details of the labour are briefly as follows:—1 died undelivered; 8 were terminated by the natural powers, in 3 of which the feet, and in 3 the head presented; in 2 the presentation is doubtful; 6 were delivered by turning, or by traction on the lower extremities; 4 were delivered instrumentally.

Footling presentation is the most favourable.

The details of the cases in which the feet presented, or in which turning was performed, clearly show that footling presentation is by far the most favourable, and it is fortunate the feet often present naturally. The inference, of course, is, that version should be resorted to whenever any other presentation is met with in cases of double monstrosity of this type; but, unfortunately, this rule could rarely be carried into execution, since we possess no means of diagnosing the junction of the fetuses at a sufficiently early stage of labour to admit of turning being performed. It is only under exceptionally favourable circumstances that this can be done; as, for example, in a case recorded by Molas,¹ in which both heads presented, but neither would enter the brim of the pelvis.

The chief difficulty is in the

The great difficulty must of course be in the delivery of the heads; for in all the recorded cases, with one exception, the bodies have passed through the pelvis parallel to each

¹ *Mém. de l'Académie*, vol. i.

other with comparative ease until the necks have appeared, and then, as a rule, they could be brought no farther. It is clear that the remainder of the fœtuses could no longer pass simultaneously; and, were direct traction continued, the heads would be inextricably fixed above the brim. In accordance with the direction of the pelvic axes the posterior head must first engage in the inlet; and in order to effect this, it will be necessary to carry the bodies of the children well over the abdomen of the mother. This seems to be a point of primary importance. It would also be advisable to see that the bodies are made to pass through the pelvis with their backs in the oblique diameter. By this means more space is gained than if the backs were placed antero-posteriorly; while, at the same time, there is less chance of the heads hitching against the promontory of the sacrum and symphysis pubis, which otherwise would be very apt to occur.

delivery of the heads.

Necessity of endeavouring to engage one head alone in the pelvic cavity.

When the head presents, and the labour is terminated by the natural powers, delivery seems to be accomplished in one of two ways.

Mode of delivery when the head presents.

In the first and more common, the head and shoulders of one child are born, its breech and legs being subsequently pushed through the pelvis by a process similar to that of spontaneous evolution; and, afterwards, the second child probably passes footling without much difficulty.

Barkow relates a case in which *both* heads were delivered by the forceps, the bodies subsequently passing simultaneously. Two similar instances are recorded in the third and sixth volumes of the 'Obstetrical Transactions.' When delivery takes place in this manner, the head of the second child must fit into the cavity formed by the neck of the first, and the pelvis must necessarily be sufficiently roomy to admit of the expulsion of the head of the second child, while its cavity is diminished in size by the presence of the neck and shoulders of the first. Either of these processes must obviously require exceptionally favourable conditions as regards the size of the child and the pelvis; and the difficulty in the way of delivery must be much greater than when the lower extremities present. Therefore, I think the rule should be laid down that, when the nature of case is made out (and for the purpose of accurate diagnosis a com-

plete examination under anaesthesia should be practised), turning should be performed, and the feet brought down.

Mutilation
of the
fœtuses
may be
required.

In the event of its being found impossible to effect delivery after a considerable portion of the bodies is born, no resource remains but the mutilation of the body of one child, so as to admit of the passage of the other. This was found necessary in one case in which the children presented by the feet, and were born as far as the thorax, but could get no farther. The body of the anterior child was removed by a circular incision as far as it had been expelled, which allowed the remaining portion, consisting of the head and shoulders, to re-enter the uterus; after this the posterior child was easily extracted, and the mutilated fœtus followed without difficulty.

Class B.

In class B, in which the children are united back to back, 3 cases are recorded, all of which were delivered by the natural powers. One of these is the case of Judith and Helène, the celebrated Hungarian twins, who lived to the age of twenty-three. Helène was born as far as the umbilicus, and, after the lapse of three hours, her breech and legs descended. Judith was expelled immediately afterwards, her feet descending first. Exactly the same process occurred in a case described by M. Norman, the children being also born alive, and dying on the ninth day.

Labour is
easier than
in class A.

It is probable that labour is easier in this class of double monsters than in the former, because the children are so joined that there is no necessity for the bodies to be parallel to each other during birth when the head presents, and after the birth of the head and shoulders of the first child its breech and lower extremities are evidently pushed down and expelled by a process of spontaneous evolution. If the feet originally presented, the mechanism of delivery and the rules to be followed would be the same as in class A; but the difficulty would probably be greater, since the juncture is not so flexible, and a more complete parallelism of the bodies would be necessary during extraction.

Class C.

In class C, that of the dicephalous monsters, I have found the description of the birth of 7 cases, 2 of which were terminated by the natural powers. Here again, the process of evolution was the main agent in delivery; one head being born and becoming fixed under the arch

of the pubes, the body being subsequently pushed past it, the second head following without difficulty. This process failing, the proper course is clearly to decapitate the first born head, and then bring down the feet of the child, when delivery can be accomplished with ease. This was the course adopted in 2 out of the 7 cases; and it may be done with the less hesitation since, from their structural peculiarities, it is extremely improbable that monsters of this kind should survive. If the feet presented, the case may be managed in the same manner as in class A.

Monstrosities of class D, in which the heads are united, Class D. the bodies being distinct, appear to be the most uncommon of all; and I can find the description of delivery in only 2 cases. One of these gave rise to great difficulty; the labour in the other was easy. We should scarcely anticipate much difficulty in the birth of monsters of this type; for, if the head presented and would not pass, we should naturally perform craniotomy; and if the bodies came first, the delivery of the monstrous head could readily be accomplished by perforation.

The result to the mothers in all these cases seems to have been very favourable. There is only one in which the death of the mother is recorded; and although in many the result is not mentioned, we may fairly assume that recovery took place. Results to the mothers.

Among difficulties in labour, some of the most important are due to morbid conditions of the fœtus itself.

Of these the most common, as well as the most serious, is caused by intra-uterine hydrocephalus (giving rise to a collection of watery fluid within the cranium), by which the dimensions of the child's head are enormously increased, and the due relations between it and the pelvic cavity entirely destroyed (fig. 120). Intra-uterine hydrocephalus.

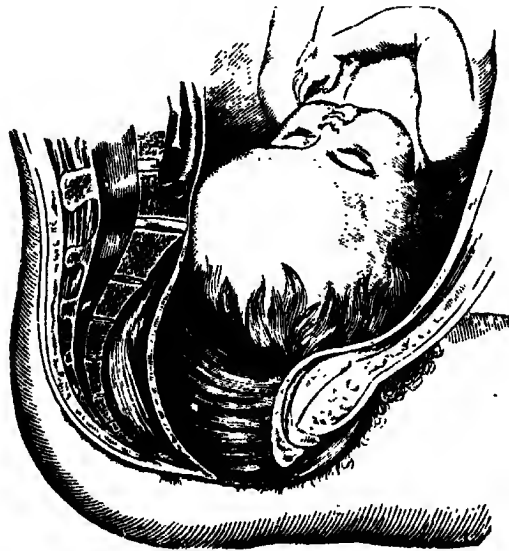
Fortunately, this disease is of comparatively rare occurrence, for it is one of great gravity both as regards the mother and child. As regards the mother, the serious character of the complication is proved by the statistics of Dr. Keiller, of Edinburgh, who found that, out of 74 cases, no less than 16 were accompanied by rupture of the uterus. The reason of the danger to which the mother is subjected is obvious. In some few cases, indeed, the head is Its danger both as regards the mother and child.

so compressible that, provided the amount of contained fluid be small, it may be sufficiently diminished in size, by the moulding to which it is subjected, to admit of its being squeezed through the pelvis. In the majority of cases, however, the size of the head is too great for this to occur. The uterus therefore exhausts itself, and may even rupture, in the vain endeavour to overcome the obstacle; while the large and distended head presses firmly on the cervix, or on the pelvic tissues, if the os be dilated, and all the evil effects of prolonged compression are apt to follow.

Its diagnosis is not always easy.

The diagnosis of intra-uterine hydrocephalus is by no means so easy as the description in obstetric works would lead us to believe. It is true that the head is much larger

Fig. 120.



LABOUR IMPEDED BY HYDROCEPHALUS.

and more rounded in its contour than the healthy foetal cranium, and also that the sutures and fontanelles are more wide, and admit occasionally of fluctuation being perceived through them. Still it is to be remembered that the head is always arrested above the brim, where it is consequently high up and difficult to reach, and where these peculiarities are made out with much difficulty. As a matter of fact, the true nature of the case is comparatively rarely discovered before delivery; thus Chaussier¹ found that in more than one-half

¹ *Gazette Médicale*, 1864.

of the cases he collected an erroneous diagnosis had been made.

Whenever we meet with a case in which either the history of previous labour, or a careful examination, convince us that there is no obstacle due to pelvic deformity, in which the pains are strong and forcing, but in which the head persistently refuses to engage in the brim, we may fairly surmise the existence of hydrocephalus. Nothing, however, short of a careful examination under anæsthesia, the whole hand being passed into the vagina so as to explore the presenting part thoroughly, will enable us to be quite sure of the existence of this complication. Under these circumstances such a complete examination is not only justified but imperative; and, when it has been made, the difficulties of diagnosis are lessened, for then we may readily make out the large round mass, softer and more compressible than the healthy head, the widely separated sutures, and the fluctuating fontanelles.

Method of
diagnosis.

In a considerable proportion of cases—as many, it is said, as 1 out of 5—the fœtus presents by the breech. The diagnosis is then still more difficult; for the labour progresses easily until the shoulders are born, when the head is completely arrested, and refuses to pass with any amount of traction that is brought to bear on it. Even the most careful examination may not now enable us to make out the cause of the delay, for the finger will impinge on the comparatively firm base of the skull, and may be unable to reach the distended portion of the cranium. At this time abdominal palpation might throw some light on the case, for the uterus being tightly contracted round the head, we might be able to make out its unusual dimensions. The wasted and shrivelled appearance of the child's body, which so often accompanies hydrocephalus, would also arouse suspicion as to the cause of delay. On the whole such cases may be fairly assumed to be less dangerous to the mother than when the head presents; for, in the latter, the soft parts are apt to be subjected to prolonged pressure and contusion; while, in the former, delay does not commence until after the shoulders are born, and then the character of the obstacle would be sooner discovered, and appropriate means earlier taken to overcome it.

Pelvic
presenta-
tions are
frequently
met with.

Treatment.

The treatment is simple, and consists in tapping the head, so as to allow the cranial bones to collapse. There is the less objection to this course, since the disease almost necessarily precludes the hope of the child's surviving. The aspirator would draw off the fluid effectually, and would at least give the child a chance of surviving; and, under certain circumstances, the birth of a child, who lives for a short time only, may be of extreme legal importance. More generally the perforator will be used, and as soon as it has penetrated, a gush of fluid will at once verify the diagnosis. Schroeder recommends that, after perforation, turning should be performed, on account of the difficulty with which the flaccid head is propelled through the pelvis. This seems a very unnecessary complication of an already sufficiently troublesome case. As a rule, when once the fluid has been evacuated, the pains being strong, as they generally are, no delay need be apprehended. Should the head not come down, the blades of the cephalotribe may be applied, which take a firmer grasp than the forceps, and enable the head to be crushed to a very small size and readily withdrawn.

Treatment
when the
breach
presents.

When the breach presents, the head must be perforated through the occipital bone, and generally this may be accomplished behind the ear without much difficulty. It has been said that opening the vertebral canal might allow the intra-cranial fluid to escape, but I am not aware that the suggestion has ever been carried into practice.

Other
forms of
dropsical
effusions.

Other forms of dropsical effusions may give rise to some difficulty, but by no means so serious. In a few rare cases the thorax has been so distended with fluid as to obstruct the passage of the child. Ascites is somewhat more common; and, occasionally, the child's bladder has been so enormously distended with urine as to simulate an ascitic abdomen, and prevent the birth of the body. The existence of any of these conditions is easily ascertained; for the head or breach, whichever happens to present, is delivered without difficulty, and then the rest of the body is arrested. This will naturally cause the practitioner to make a careful exploration, when the cause of the delay will be detected.

The treatment consists in the evacuation of the fluid by puncture. In the case of ascites, this should always

be done, if possible, by a fine trocar or aspirator, so as not to injure the child. This is all the more important since it is impossible to distinguish distended bladder from ascites, and an opening of any size into that viscus might prove fatal, whereas aspiration would do little or no harm, and prove quite as efficacious.

Certain foetal tumours may occasion dystocia, such as malignant growths, or tumours of the kidney, liver, or spleen. Cases of this kind are recorded in most obstetric works. Hydro-encephacele, or hydro-rachitis, depending on defective formation of the cranial or spinal bones, with the formation of a large protruding bag of fluid, is not very rare. The diagnosis of all such cases must necessarily be somewhat obscure, nor is it possible to lay down any definite rules for their management, which must vary according to the particular exigencies. The tumours are rarely of sufficient size to prove very formidable obstacles to delivery, and many of them are very compressible. This is especially the case with spina bifida and similar cystic growths. Puncture, and in the more solid growths of the abdomen or thorax, evisceration, may be required.

Foetal
tumours
obstruct-
ing de-
livery.

Other deformities, such as the anencephalous foetus, or defective development of the thorax or abdominal parietes with protrusion of the viscera, are not likely to cause any difficulty; but they may much embarrass the diagnosis by the strange and unusual presentation that is felt. If, in any case of doubt, a full and careful examination be undertaken, introducing the whole hand if necessary, no serious mistake is likely to be made.

Other
congenital
deformi-
ties.

In addition to dystocia from morbid condition of the foetus, it is admitted that difficulties may arise from its undue development, and especially from excessive size and advanced ossification of the skull. This last is especially likely to cause delay. Even the slight difference in size between the male and female head was found by Simpson to have an appreciable effect in increasing the difficulty of labour, when the statistics of a large number of cases were taken into account; for he proved beyond doubt that the difficulties and casualties of labour occurred in decidedly larger proportion in male than in female births. Other circumstances, besides sex, have an important effect on the size of the child. Thus

Dystocia
from ex-
cessive
develop-
ment of
the foetus.

Duncan and Hecker have shown that it increases in proportion to the age of the mother and the frequency of the labours, while the size of the parents has no doubt also an important bearing on the subject.

Although these influences modify the results of labour *en masse*, they have little or no practical bearing on any particular case, since it is impossible to estimate either the size of the head, or the degree of its ossification, until labour is advanced.

Its treatment.

When labour is actually retarded by undue ossification or large size of the head, the case must be treated on the same general principles which guide us when the want of proportion is caused by pelvic contraction. Hence, if delay arise, which the natural powers are insufficient to overcome, it will seldom happen that the disproportion is too great for the forceps to overcome. If we fail to deliver by them, no resource is left but the lessening of the bulk of the head by perforation.

Large size of the body rarely causes delay.

Large size of the body of the child is still more rarely a cause of difficulty, for, if the head be born, the compressible trunk will almost always follow. Still, a few authentic cases are on record, in which it was found impossible to extract the foetus on account of the unusual bulk of its shoulders and thorax. Should the body remain firmly impacted after the birth of the head, it is easy to assist its birth by traction on the axillæ, by gently aiding the rotation of the shoulders into the antero-posterior diameter of the pelvic cavity, and, if necessary, by extracting the arms, so as to lessen the bulk of the part of the body contained in the pelvis. Hicks relates a case in which evisceration was required for no other apparent reason than the enormous size of the body. The necessity for any such extreme measure must, of course, be of the greatest possible rarity; and it is quite exceptional for difficulty from this source to be beyond the powers of nature to overcome.

CHAPTER XII.

DEFORMITIES OF THE PELVIS.

DEFORMITIES of the pelvis form one of the most important subjects of obstetric study, for from them arise some of the gravest difficulties and dangers connected with parturition. A knowledge, therefore, of their causes and effects, and of the best mode of detecting them, either during or before labour, is of paramount necessity; but the subject is far from easy, and it has been rendered more difficult than it need be, from over-anxiety on the part of obstetricians to force all varieties of pelvic deformities within the limits of their favourite classification.

Importance of subject.

Many attempts in this direction have been made, some of which are based on the causes on which the deformities depend, others on the particular kind of deformity produced. The changes of form, however, are so various and irregular, and similar, or apparently similar, causes so constantly produce different effects, that all such endeavours have been more or less unsuccessful. For example, we find that rickets (of all causes of pelvic deformity the most important) generally produces a narrowing of the conjugate diameter of the brim; while the analogous disease, osteo-malacia, occurring in adult life, generally produces contraction of the transverse diameter, with approximation of the pubic bones, and relative or actual elongation of the conjugate diameter. We might, therefore, be tempted to classify the results of these two diseases under separate heads, did we not find that, when rickets affects children who are running about, and subject to mechanical influences similar to those acting upon patients suffering from osteo-malacia, a form of pelvis is produced hardly distinguishable from that met with in the latter disease.

Difficulties of classification.

Objections to classification depending on cause

On the whole, therefore, the most simple, as well as the most scientific, classification is that which takes as its basis

Most simple classification.

tion is based on nature of deformities.

the particular seat and nature of the deformity. Let us first glance at the most common causes.

Causes of pelvic deformity.

Determining causes similar to those producing development of the healthy pelvis. Sometimes merely acting in excess. Sometimes in bones softened by disease.

The key to the particular shape assumed by a deformed pelvis will be found in a knowledge of the circumstances which lead to its regular development and normal shape in a state of health. The changes produced may, almost invariably, be traced to the action of the same causes which produce a normal pelvis, but which, under certain diseased conditions of the bones or articulations, induce a more or less serious alteration in form. These have been already described in discussing the normal anatomy of the pelvis, and it will be remembered that they are chiefly the weight of the body, transmitted to the iliac bones through the sacro-iliac joints, and counter-pressure on these, acting through the acetabula. Sometimes they act in excess on bones which are healthy, but possibly smaller than usual, and the result may be the formation of certain abnormalities in the size of the various pelvic diameters. At other times they operate on bones which are softened and altered in texture by disease, and which, therefore, yield to the pressure far more than healthy bones.

Difference between rickets and osteomalacia.

The two diseases which chiefly operate in causing deformity are rickets and osteomalacia. Into the essential nature and symptomatology of these complaints it would be out of place to enter here; it may suffice to remind the reader that they are believed to be pathologically similar diseases, with the important practical distinction that the former occurs in early life before the bones are completely ossified, and that the latter is a disease of adults producing softening in bones that have been hardened and developed. This difference affords a ready explanation of the generally resulting varieties of pelvic deformity.

Effects of rickets.

Rachitis commences very early in life, sometimes, it is believed, even in utero. It rarely produces softening of the entire bones, and only in cases of very great severity of those parts of the bones that have been already ossified. The effects of the disease are principally apparent in the cartilaginous portions of the bones, in which osseous deposit has not yet taken place. The bones, therefore, are not subject to uniform change, and this fact has an important influence in determining their shape. Ricketty chil-

dren also have imperfect muscular development; they do not run about in the same way as other children, they are often continuously in the recumbent or sitting postures, and thus the weight of the trunk is brought to bear, more than in a state of health, on the softened bones. For the same reason counter-pressure through the acetabula is absent or comparatively slight. When, however, the disease occurs for the first time in children who are able to run about, the latter comes into operation, and modifies the amount and nature of the deformity. It is to be observed that in ricketty children the bones are not only altered in form from pressure, but are also imperfectly developed, and this, in itself, materially modifies the deformity. When ossific matter is deposited, the bones become hard and cease to bend under external influences, but retain for ever the altered shape they have assumed.

In osteo-malacia, on the contrary, the already hardened bones become softened uniformly through all their textures, and thus the changes which are impressed upon them are much more regular, and more easily predicated. It is, however, an infinitely less common cause of pelvic deformity than rickets, as is evidenced by the fact that in the Paris Maternity in a period of sixteen years, 402 cases of deformity due to rickets occurred to 1 due to osteo-malacia.¹

Effects of
osteo-
malacia.

The frequency of both diseases varies greatly in different countries, and under varying circumstances. Rickets is much more common amongst the poor of large cities, whose children are ill-fed, badly clothed, kept in a vitiated atmosphere, and subjected to unfavourable hygienic conditions of all kinds. Deformities are, therefore, more common in them than in the more healthy children of the upper classes, or of the rural population. The frequency of osteo-malacia is also found to be very different in certain places than in others. Thus the higher degrees of deformity, necessitating the Cæsa-rean section, or craniotomy, are in this country of extreme rarity; while, in certain districts on the continent, they seem to be so frequent, that these ultimate resources of the obstetric art have to be constantly employed.

Their
varying
frequency.

In another class of cases the ordinary shape is modified by weight and counter-pressure operating on a pelvis in which one or more of the articulations is ossified. In this

Effects of
ossifica-
tion of
pelvic arti-
culation.

¹ Stanesco, *Recherches Cliniques sur les Retrecissements du Bassin*.

way we have produced the *obliquely ovate* pelvis of Naegelé, or the still more uncommon *transversely contracted* pelvis of Robert.

Other
causes of
pelvic
deformity.

A certain number of deformed pelvises cannot be referred to a modification of the ordinary developmental changes of the bones. Amongst these are the deformities resulting from *spondylolithesis*, or downward dislocation of the lower lumbar vertebræ; from displacements of the sacrum, produced by curvatures of the spinal column; or from diseases of the pelvic bones themselves, such as tumours, malignant growths, and the like.

Equally
enlarged
pelvis.

The first class of deformed pelvises to be considered is that in which the diameters are altered from the usual standard, without any definite distortion of the bones; and such are often mere congenital variations in size, for which no definite explanation can be given. Of this class is the pelvis which is equally enlarged in all its diameters (*pelvis equalibeter justo major*), which is of no obstetric consequence, except inasmuch as it may lead to precipitate labour, and is not likely to be diagnosed during life.

Equally
contracted
pelvis.

The corresponding diminution of all the pelvic diameters (*pelvis equalibeter justo minor*) may be met with in women who are apparently well formed in every respect, and whose external conformation and previous history give no indication of the abnormality. Sometimes the diminution amounts to half an inch or more, and it can readily be understood that such a lessening in the capacity of the pelvis would give rise to serious difficulty in labour. Thus, in 3 cases recorded by Naegelé a fatal result followed; in 2 after difficult instrumental delivery, and in the third after rupture of the uterus. The equally lessened pelvis, however, is of great rarity. An unusually small pelvis may be met with in connection with general small size, as in dwarfs. It does not necessarily follow, because a woman is a dwarf, that the pelvis is too small for parturition. On the contrary, many such women have borne children without difficulty.

The un-
developed
pelvis.

(d) In some cases we have a pelvis which retains its infantile characteristics after puberty (fig. 121). In these the normal development of the pelvis has been in some way interfered with, possibly from premature ossification of the different portions of the innominate bones, or from arrest of their

growth by a weakly or rachitic constitution. The measurements of these pelves are not always below the normal standard; they may continue to grow, although they have not developed. The proportionate measurements of the various diameters will then be as in the infant; and the antero-posterior diameter may be longer, or as long, as the transverse, the ischia comparatively near each other, and the pubic arch narrow. Such a form of pelvis will interfere with the mechanism of delivery, and unusual difficulty in labour will be experienced. Difficulties from a similar cause may be expected in pregnancies occurring in very young girls. Here, however, there

Fig. 121.



ADULT PELVIS RETAINING ITS INFANTILE TYPE.

is reason to hope that, as age advances, the pelvis will develop, and subsequent labours be more easy.

The *masculine*, or funnel-shaped, pelvis owes its name to its approximation to the type of the male pelvis. The bones are thicker and stouter than usual, the conjugate diameter of the brim longer, and the whole cavity rendered deeper and narrower at its lower part by the nearness of the ischial tuberosities. It is generally met with in strong muscular women following laborious occupations, and Dr. Barnes, from his experience in the Royal Maternity Charity, says that it chiefly occurs in weavers in the neighbourhood of Bethnal Green, who spend most of their time in the sitting posture. 'The cause of this form of pelvis seems to be an advanced

Masculine
or funnel-
shaped
pelvis.

condition of ossification in a pelvis which would otherwise have been *infantile*, brought about by the development of unusual muscularity, corresponding to the laborious employment of the individual.' The difficulties in labour will naturally be met with towards the outlet, where the funnel shape of the cavity is most apparent.

Contraction of conjugate diameter of brim.

Diminution of the antero-posterior diameter is most frequently limited to the brim, and is by far the most common variety of pelvic deformity. In its slighter degrees it is not necessarily dependent on rickets although when more marked it almost invariably is so. When unconnected with rickets, it probably can be traced to some injurious influence before the bones have ossified, such as increased pressure of the trunk from carrying weights in early childhood, and the like. By this means the sacrum is unduly depressed, and projects forwards, so as to slightly narrow the conjugate diameter.

Mode of production in rickets.

When caused by rickets the amount of the contraction varies greatly, sometimes being very slight, sometimes sufficient to prevent the passage of the child altogether, and necessitate craniotomy or the Cæsarean section. The sacrum, softened by the disease, is pressed vertically downwards by the weight of the body, its descent being partially resisted by the already ossified portions of the bone, so that the result is a downward and forward movement of the promontory. The upper portion of the sacral concavity is thus directed more backwards; but, as the apex of the bone is drawn forwards by the attachment of the perineal muscles to the coccyx, and by the sacro-ischiatic ligaments, a sharp curve of its lower part in a forward direction is established.

Occasional increase of transverse diameter.

The depression of the sacral promontory would tend to produce strong traction, through the sacro-iliac ligaments, on the posterior ends of the sacro-cotyloid beams, and thus induce expansion of the iliac bones, and consequent increase of the transverse diameter of the brim. So an unusual length of the transverse diameter is very often described as accompanying this deformity, but probably it is not so often apparent as might otherwise be expected, on account of the imperfect development of the bones generally accompanying rickets; and Barnes¹ says that in the parts of London where deformities are most rife, any enlargement of the transverse

¹ *Lectures on Obst. Operations*, p. 280.

diameter is exceedingly rare. Frequently the sacrum is not only depressed, but displaced more or less to one side, most generally to the left, thus interfering with the regular shape of the deformed brim. This is often the result of a lateral flexion of the spinal column, depending on the rachitic diathesis.

In most cases of this kind the cavity of the pelvis is not diminished in size, and is often even more than usually wide. The constant pressure on the ischia, which the sitting posture of the child entails, tends to force them apart, and also to widen the pubic arch. Considerable advantage results from this in cases in which we have to perform obstetric operations, as it gives plenty of room for manipulation.

Cavity of pelvis is generally not affected.

Fig. 122.



HICKETTY PELVIS, WITH BACKWARD DEPRESSION OF THE SYMPHYSES PUBES.

In a few exceptional cases the narrowing of the conjugate diameter is increased by a backward depression of the symphysis pubis, which gives the pelvic brim a sort of figure of eight shape (fig. 122). The most reasonable explanation of this peculiarity seems to be, that it is the result of the muscular contraction of the recti muscles, at their point of attachment, when the centre of gravity of the body is thrown backwards, on account of the projection of the sacral promontory. Sometimes also the antero-posterior diameter of the cavity is unusually lessened by the disappearance of the vertical curvature of the sacrum, which, instead of forming a distinct cavity, is nearly flat (fig. 123).

Figure of eight deformity.

In a few rare cases, to which attention was first called in 1853 by Kilian of Bonn, a very formidable narrowing of the conjugate diameter of the pelvic brim is produced by a down-

Spondylolithesis.

ward displacement of the fourth and fifth lumbar vertebræ, which become dislocated forward, or if not actually dislocated, at least separated from their several articulations to a suffi-

Fig. 123.



FLATNESS OF SACRUM WITH NARROWING OF PELVIC CAVITY.

cient extent to encroach very seriously on the dimensions of the pelvic inlet. This condition is known as *spondylolithesis*. (Fig. 124.)

The effect of this is sufficiently obvious, for the projection of the lumbar vertebræ takes the place of the sacral promontory, and prevents the passage of the child. To such an extent is obstruction thus produced, that, in the majority of the recorded cases, the Cæsarean section was found to be necessary. The true conjugate diameter, that between the promontory of the sacrum and the symphysis pubis, is increased rather than diminished; but, for all practical purposes, the condition is similar to extreme narrowing of the conjugate from rickets, for the bodies of the displaced vertebræ project into and obstruct the pelvic brim.

Fig. 124.



PELVIS DEFORMED BY SPONDYLOLITHESIS.

The cause of this deformity seems to be different in dif-

ferent cases. In some it seems to have been congenital, and in others to have depended on some antecedent disease of the bones, such as tuberculosis or scrofula, producing inflammation and softening of the connection between the last lumbar vertebræ and the sacrum, thus permitting downward displacement of the bones. Lambl believed that it generally followed spina bifida, which had become partially cured, but which had produced deformity of the vertebræ, and favoured their dislocation. Brodhurst,¹ on the other hand, thinks that it most probably depends on rachitic inflammation and softening of the osseous and ligamentous structures, and that it is not a dislocation in the strict sense of the word.

The most marked examples of narrowing of both oblique diameters depend on osteo-malacia. In the disease, as has

Narrowing
of the
oblique
diameter.

Fig. 125.



OSTEO-MALACIC PELVIS.

already been remarked, the bones are uniformly softened; and the alterations in form are further influenced by the fact that the disease commences after union of the separate portions of the os innominatum has been completely effected. The amount of deformity in the worst cases is very great, and frequently renders delivery impossible without the Cæsarean section. Sometimes the softening of the bones proves of service in delivery, by admitting of the dilatation of the contracted pelvic diameter by the pressure of the presenting part, or even by the hand. Some curious cases are on record, in which the deformity was so great as to apparently

Deformity
from osteo-
malacia.

¹ *Obst. Trans.* vol. vi. p. 97.

require the Cæsarean section, but in which the softened bones eventually yielded sufficiently to render this unnecessary.

Mode of
production
in osteo-
malacia.

The weight of the body depresses the sacrum in a vertical direction, and at the same time compresses its component parts together, so as to approximate the base and apex of the bone, and narrow the conjugate diameter of the brim, by causing the promontory to encroach upon it. The most characteristic changes are produced by the pushing inwards of the lateral walls of the pelvis at the cotyloid cavities, in consequence of the pressure exerted at these points through the femurs. The effect of this is to bring together the sides of the pelvis, and diminish both oblique

Fig. 126.



EXTREME DEGREE OF OSTEO-MALACIC DEFORMITY.

diameters, giving the brim somewhat the shape of a trefoil, or an ace of clubs. The sides of the pubis are at the same time approximated, and may become almost parallel, when the true conjugate may be even lengthened (fig. 125). The tuberosities of the ischia are also compressed together, with the rest of the lateral pelvic wall, so that the outlet is greatly deformed as well as the brim (fig. 126).

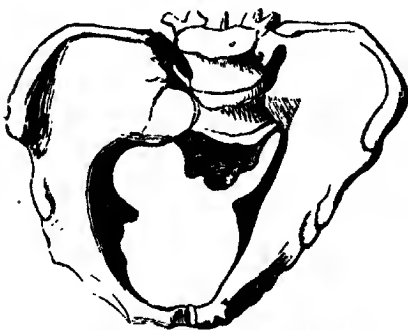
Obliquely
contracted
pelvis.

That form of deformity in which one oblique diameter only is lessened, has received considerable attention, from having been made the subject of special study by Naegelé, and is generally known as the *obliquely contracted pelvis* (fig. 127). It is a condition that is very rarely met with, although it is interesting from an obstetric point of view, as throwing considerable light on the mode in which the natural development of the pelvis is effected. It is also difficult to diagnose, inasmuch as there is no apparent external de-

formity to lead us to suspect pelvic disease, and probably it has never, in fact, been detected before delivery. It has a very serious influence on the labour; Litzman found that out of 28 cases of this deformity, 22 died in their first labours, and 5 more in subsequent deliveries. The prognosis, therefore, is very formidable, and renders a knowledge of this distortion, rare though it be, of much importance.

Its essential characteristic is flattening and want of development of one side of the pelvis, associated with anchylosis of the corresponding sacro-iliac synchondrosis. The latter is probably always present, and it seems to be most generally a congenital malformation. The lateral half of the sacrum on the same side, and the entire innominate bone is much atrophied. The promontory of the sacrum is directed towards

Fig. 127.



OBLIQUELY CONTRACTED PELVIS.

the diseased side, and the symphysis pubis is pushed over towards the healthy side.

The main agent in the production of this deformity is the absence of the sacro-iliac joint, which prevents the proper lateral expansion of the pelvic brim on that side, and allows the counter-pressure, through the femur, to push in the atro-

phied os innominatum to a much greater extent than usual. The chief diminution in the length of the pelvic diameter is between the ilio-pectineal eminence of the affected side and the healthy sacro-iliac joint; while the oblique diameter between the anchylosed joint and the healthy os innominatum is of normal length.

Transverse contraction of the pelvic brim is very much less common than narrowing of the conjugate diameter. It most frequently depends on backward curvature of the lower parts of the spinal column, in consequence of disease of the vertebræ. This form of deformed pelvis is generally known as the kyphotic. The effect of the spinal curvature is to drag the promontory of the sacrum backwards, so that it is high up and out of reach. By this means the antero-posterior diameter of the brim is increased, while the transverse is lessened; the relative proportion between the two is

Narrowing of the transverse diameter.

Kyphotic deformities.

thus reversed. While the upper proportion of the sacrum is displaced backwards, its lower end is projected forward,

Fig. 128.



ROBERT'S OR DOUBLE OBLIQUELY CONTRACTED PELVIS.

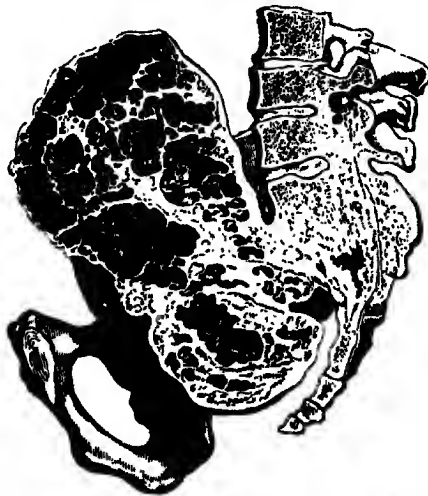
so that the antero-posterior diameters of the cavity and outlet are considerably diminished. The ischial tuberosities are also nearer to each other, and the pubic arch is narrowed. In this deformity it will be observed that the obstruction to delivery will be chiefly met with at the outlet and lower parts of the pelvic cavity; for, although the transverse diameter of the brim is narrowed, there is

generally sufficient space for the passage of the head.

Robert's
pelvis.

Another form of transversely contracted pelvis is known as *Robert's pelvis* (fig. 128), having been first described by Robert, of Coblenz. It is in fact a double obliquely contracted pelvis, depending on ankylosis of the sacro-iliac joints on both sides, and consequent defective development

Fig. 129.



BONY GROWTH FROM SACRUM OBSTRUCTING THE PELVIC CAVITY.

of both innominate bones. The shape of the pelvic brim is markedly oblong, and the sides of the pelvis are more or less parallel with each other. The outlet is also much con-

tracted in the transverse direction. The amount of obstruction is very great, so that, according to Schroeder, out of 7 well-authenticated cases the Cæsarean section was required in 6.

Another cause of transverse deformity, occasionally met with, is luxation of the head of the femur, depending on old-standing joint disease. The head of the femur, in this case, presses on the innominate bone at the site of dislocation, and the result is that the iliac fossa on the affected side, or both if the accident happens on both sides, is pushed inwards, while the transverse diameter of the brim is lessened. The tuberosity of the ischium is, however, projected outwards, so that the outlet of the pelvis is increased rather than diminished.

Deformity from old-standing hip-joint disease.

Obstruction of the pelvic cavity from exostosis or other forms of tumours growing from the bones is described in most obstetric works, although the condition is one of great rarity. (fig. 129). It may, however, be met with, and produce very serious dystocia. Several curious examples are collected in Mr. Wood's article on the pelvis, in some of which the obstruction was so great as to necessitate the Cæsarean section. Some of these growths were true bony exostoses; others osteosarcomatous tumours attached to the pelvic bones, most generally the upper part of the sacrum; and others were malignant. In some cases, probably connected with the gouty or rheumatic diathesis, spiculæ of bone have developed about the linea ilio-pectinea or other parts of the pelvis, which may not be sufficient to produce obstruction, but which may injure the uterus, or even the foetal head, when they are pressed upon them. Irregular projections may also arise from the callus of old fractures of the pelvic bones. All such cases defy classification, and differ so greatly in their extent, and in their effect on labour, that no rules can be laid down for them, and each must be treated on its own merits.

Deformity from tumours, fractures &c

The effects of pelvic contractions on labour vary, of course, greatly with the amount and nature of the deformity; but they must always give rise to anxiety, and, in the graver degrees, they produce the most serious difficulties we have to contend with in the whole range of obstetrics.

Effects of contracted pelvis in labour.

In the slighter degrees, in which the proportion between the presenting part and the pelvis is only slightly altered,

Nature of uterine action in

pelvic
deformity.

we may observe little abnormal beyond a greater intensity of the pains and some protraction of the labour. It is generally observed that the uterine contractions are strong and forcible in cases of this kind, probably because of the increased resistance they have to contend against; and this is obviously a desirable and conservative occurrence, which may, of itself, suffice to overcome the difficulty. The first stage, however, is not unfrequently prolonged, and the pains are ineffective, for the head does not readily engage in the brim, the uterus is more mobile than in ordinary labours, and it probably acts at a disadvantage.

Risk to the
mother.

In the more serious cases, the mother is obviously subjected to many risks, directly proportionate to the amount of obstruction and the length of the labour. The long continued and excessive uterine action produced by the vain endeavours to push the child through the contracted pelvic canal, the more or less prolonged contusion and injury to which the maternal soft parts are necessarily subjected (not unfrequently ending in inflammation and sloughing with all its attendant dangers), and the direct injury which may be inflicted, by the measures we are compelled to adopt for aiding delivery (such as the forceps, turning, craniotomy, or even the almost inevitably fatal Casarcan section), all tend to make the prognosis of these cases a matter of grave anxiety.

Risk to
the child.

Nor are the dangers less to the child; and a very large proportion of still-births will always be met with. The infantile mortality may be traced to a variety of causes, the most important being the protraction of the labour and the continuous pressure to which the presenting part is subjected. For this reason, even in cases in which the contraction is so slight that the labour is terminated by the natural powers, it has been estimated that 1 out of every 5 children is still-born; and as the deformity increases in amount, so, of course, does the prognosis to the child become more unfavourable.

Frequent
occurrence
of prolapse
of the 2.
cord.

Prolapse of the umbilical cord is well known to be of very frequent occurrence in cases of pelvic deformity, the tendency to this accident being traceable to the fact of the head not entering and occupying the upper strait of the pelvis as in ordinary labours, and thus leaving a space through which

the cord may descend. So frequently is this complication met with in pelvic deformity that Stanesco¹ found it had happened as often as 59 times in 414 labours; and when the dangers of prolapsed funis are added to those of protracted labours, it is hardly a matter of surprise that the occurrence should, under such circumstances, almost always prove fatal to the child.

The head of the child is also liable to injury of a more or less grave character from the compression to which it is subjected, especially by the promontory of the sacrum. Independently of the transient effects of undue pressure, (temporary alteration of the shape of the bones and evidences of bruising of the scalp), there is often met with a more serious depression of the bones of the skull produced by the pressure of the promontory. This is most marked in cases in which the head has been forcibly dragged past the projecting bone by the forceps, or after turning. The amount of depression varies with the degree of contraction; but sometimes it must be admitted that, were it not for the yielding of the bones of the foetal skull in this way, delivery, without lessening the size of the head by perforation, would be impossible. Such depressions are found at the spot immediately opposite the promontory, generally at the side of the skull near the junction of the frontal and parietal bones. Sometimes there is a slight permanent mark left, but more often the depression disappears in a few days. The prognosis to the child is, however, grave when the contraction has been sufficient to indent the skull in this way; for it has been found that 50 per cent. of the children thus marked died either immediately or shortly after labour.²

Injury to
child's
head.

The means which nature takes to overcome these difficulties are well worthy of study, and there are certain peculiarities in the mechanism of delivery when pelvic deformities exist, which it is of importance to understand, as they guide us in determining the proper treatment to adopt.

Course of
labour.

Malpresentations of the foetus are of much more frequent occurrence than in ordinary labours; partly because the head does not engage readily in the brim, but, remaining free above it, is apt to be pushed away by the uterine contractions; and partly because of the alteration of the axis of the uterine

Frequency
of mal-
presenta-
tion.

¹ *Op. cit.* p. 94.

² Schroeder, *Op. cit.* p. 256.

tumour, which is very often present. The extremely developed pendulous condition of the abdomen in cases of pelvic deformity is very obvious, so that the fundus is sometimes almost in a line with the cervix, and thus transverse or other abnormal positions are very frequently met with. It is to be noted, however, that we cannot regard breech presentations as so unfavourable as in ordinary labours, for the pressure from the contracted pelvis is less likely to be injurious when applied to the body than to the head of the child; and, indeed as we shall presently see, the artificial production of these presentations is often advisable as a matter of choice.

Mechanism of delivery in head presentations.

The mode in which the head passes naturally through a contracted pelvis is in some respects different from the ordinary mechanism of delivery in head presentations, and has been carefully worked out by Spiegelberg, and other German obstetricians.

The means which nature adopts to overcome this difficulty are different in cases in which there is a marked narrowing of the conjugate diameter of the brim, and in those in which there is a generally contracted pelvis.

a. In contracted brim.

In the former, and more common deformity, when the head enters the brim, in consequence of the resistance it meets with at the contracted part, the expelling power of the uterus acts more on the anterior part of the head than in ordinary cases, the chin becomes in some degree separated from the sternum, and the anterior fontanelle descends somewhat lower than the posterior. At this stage, on examination, it will be found, supposing we have to do with a case in which the occiput points to the left side of the pelvis, that the anterior fontanelle is felt lower than the posterior, and to the right, the bi-temporal diameter of the head is engaged in the conjugate diameter of the brim (as the smallest diameter of the skull, there is manifest advantage in this), the bi-parietal diameter and the largest portion of the head points to the left side. The sagittal suture will be felt running across in the transverse diameter of the brim, but nearer to the sacrum, the head being placed obliquely. As the head is forced down by the uterine contractions, the posterior parietal bone, which is resting on the promontory, is pushed against it so that the sagittal suture is forced more into the true

transverse diameter of the pelvic brim, and approaches nearer to the pubes. The next step is the depression of the head, the occiput undergoing a sort of rotation on its transverse axis, so that it reaches a parallel plane below the brim. When this is accomplished, the rest of the head readily passes the obstruction. The forehead now meets with the resistance of the pelvic walls, the posterior fontanelle descends to a lower level, and, as the cavity of the pelvis in cases of antero-posterior contraction of the brim is generally of normal dimensions, the rest of the labour is terminated in the usual way.

In the generally contracted pelvis the head enters the brim with the posterior fontanelle lowest, and it is after this that the resistance to its progress becomes manifest. The result is, therefore, an exaggeration of what is met with in ordinary cases. The resistance to the anterior or longer arm of the lever is greater than that to the occipital or shorter; and, therefore, the flexion of the head becomes very marked. The posterior fontanelle is consequently unusually depressed, and the anterior quite out of reach. So the head is forced down as a wedge, and its farther progress must depend upon the amount of contraction. If this be not too great the anterior fontanelle eventually descends, and delivery is completed in the usual way. Should the contraction be too much to permit of this, the head becomes jammed in the pelvis, and diminution of its size may be essential.

b. In generally contracted pelvis.

In cases of deformity of the conjugate diameter, combined with general contraction of the pelvis, the mechanism partakes of the peculiarities of both these classes, to a greater or less extent, in proportion to the preponderance of one or other species of deformity.

It rarely happens that deformities of the pelvis, except of the very gravest kind, are suspected before labour has actually commenced; and, therefore, we are not often called upon to give an opinion as to the condition of the pelvis before delivery. Should we be so, there are various circumstances which may aid us in arriving at a correct conclusion. Prominent among them is the history of the patient in childhood. If she be known to have suffered from rickets in early life, more especially if the disease has left evident traces in

Diagnosis.

Necessity
of a care-
ful exa-
mination
of the
pelvis.

deformities of the limbs, or in a dwarfed and stunted growth, or in curvature of the spine, there will be strong presumptive evidence of pelvic deformity; a markedly pendulous state of the uterine tumour may also tend to confirm the suspicion. Nothing short of a careful examination of the pelvis itself will, however, clear up the point with certainty; and even by this means, to estimate the precise degree of deformity with accuracy requires considerable skill and practice. The ingenuity of practitioners has been much exercised, it might perhaps be justly said wasted, in the invention of various more or less complicated pelvimeters for aiding us in obtaining the desired object. It is, however, pretty generally admitted by all accoucheurs, that the hand forms the best and most reliable instrument for this purpose, at any rate as regards the interior of the pelvis; although a pair of callipers, such as Baudelocque's well known instrument, is essential for accurately determining the external measurements. The objections to all internal pelvimeters, even those most simple in their construction, are their cost and complexity, and the impossibility of using them without pain or injury to the patient.

External
measure-
ments.

It was formerly thought that by measuring the distance between the spinous processes of the sacrum and the symphysis pubis, and subtracting from it what we judge to be the thickness of the bones and soft parts, we might arrive at an approximate estimate of the measurement of the conjugate diameter of the pelvic brim. It is now admitted that this method can never be depended on, and that it is practically useless. A change in the relative length of other external measurements of the pelvis is, however, often of great value in showing the existence of deformity internally, although not in judging of its amount. The measurements which are used for this purpose are between the anterior superior spines of the ilium, and between the centres of the crests of the ilia, averaging respectively $9\frac{1}{2}$ and $10\frac{1}{2}$ inches. According to Spiegelberg these measurements may give one of three results.

1. Both may be less than they ought to be, but the relation of the one to the other remains unchanged.

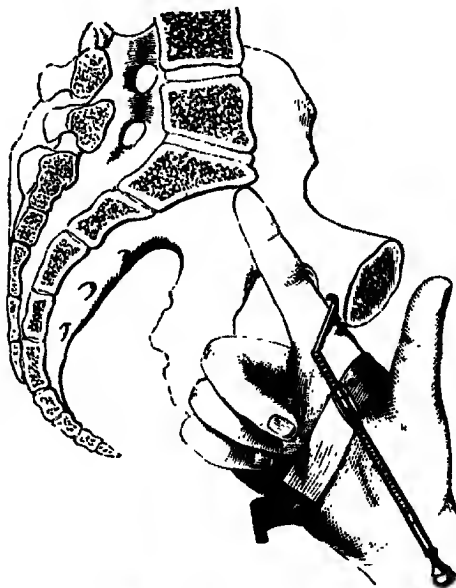
2. That between the crests is not, or is at most very little, diminished, but that between the spinous processes is increased.

3. Both are diminished, but at the same time their mutual relation is not normal, the distance between the spines being as long, if not longer, than that between the crests.

No. 1 denotes a uniformly contracted pelvis. No. 2, a pelvis simply contracted in the conjugate diameter of the brim, and not otherwise deformed. No. 3, a pelvis with narrowed conjugate and also uniformly contracted, as in the severe type of rachitic deformity.

For the purpose of making these measurements Baude-locque's *compas d'épaisseur* can be used, or Dr. Lazarewitch's

Fig. 130.



GREENHALGH'S PELVIMETER.

elegant universal pelvimeter, which can be adopted also for internal pelvimetry; but, in the absence of these special contrivances, an ordinary pair of callipers, such as are used by carpenters, can be made to answer the desired object.

These external measurements must be corroborated by internal, chiefly of the antero-posterior diameter, by which alone we can estimate the amount of the deformity. We endeavour to find, in the first place, the length of the diagonal conjugate, between the lower edge of the symphysis pubis and the promontory of the sacrum, which averages about half an inch more than the true conjugate. The patient lying in the usual obstetric

Internal
measure-
ments.

Mode of
estimating
the con-
jugate
diameter of
brim.

position, an attempt is made to reach the promontory of the sacrum with the tip of the index finger. In a healthy pelvis this is impossible, so that the mere fact of our being able to do so proves the existence of contraction. A mark is made with the nail of the index of the left hand on that part of the examining finger which rests under the symphysis, and then the distance from this to the tip of the finger, less half an inch, may be taken to indicate the measurement of the true conjugate of the brim. Various pelvimeters are meant to make the same measurements, such as Lumley Earle's, Lazarewitch's, which is similar in principle, and Van Huevel's; the best and simplest, I think, is that invented by Dr. Greenhalgh (fig. 130). It consists of a moveable rod, attached to a flexible band of metal which passes around the palm of the examining hand. At the distal end of the rod is a curved portion, which passes over the radial edge of the index finger. The examination is made in the usual way, and when the point of the finger is resting on the promontory of the sacrum, the rod is withdrawn until it is arrested by the posterior surface of the symphysis, the exact measurement of the diagonal conjugate being then read off on the scale.

It is to be remembered that this procedure is useless in the slightest degrees of contraction, in which the promontory of the sacrum cannot be reached. Dr. Ramsbotham proposes to measure the conjugate by spreading out the index and middle fingers internally, the tip of one resting on the promontory, the other behind the pubis: and then withdrawing them, in the same position, and measuring the distance between them. This manœuvre I believe to be impracticable.

Whenever, in actual labour, we wish to ascertain the condition of the pelvis accurately, the patient should be anæsthetised, and the whole hand introduced into the vagina (which could not otherwise be done without causing great pain), and the proportions of the pelvis, and the relations of the head to it, thoroughly explored; and, if what has been said as to the mechanism of delivery in these cases be borne in mind, this may aid us in determining the kind of deformity existing. In this way contractions about the outlet of the pelvis can also be pretty generally made out.

The obliquely contracted pelvis cannot be determined by

any of these methods, but certain external measurements, as Naegelé has pointed out, will readily enable us to recognise its existence. It will be found that measurements, which in the healthy pelvis ought to be equal, are unequal in the obliquely distorted pelvis. The points of measurement are chiefly: 1. From the tuberosity of the ischium on one side to the posterior superior spine of the ilium on the other: 2. From the anterior superior iliac spine on the one side to the posterior superior on the opposite: 3. From the trochanter major of one side to the posterior superior iliac spine on the other: 4. From the lower edge of the symphysis pubis to the posterior superior iliac spine: 5. From the spinous process of the last lumbar vertebra to the anterior superior spine of the ilium on either side.

Mode of
diagnosing
the oblique
pelvis.

If these measurements differ from each other by half an inch to an inch, the existence of an obliquely deformed pelvis may be safely diagnosed. The diagnosis can be corroborated by placing the patient in the erect position, and letting fall two plumb-lines, one from the spines of the sacrum, the other from the symphysis pubis. In a healthy pelvis these will fall in the same plane, but in the oblique pelvis the anterior line will deviate considerably towards the unaffected side.

The proper management of labour in contracted pelvis is, even up to this time, one of the most vexed questions in midwifery, notwithstanding the immense amount of discussion to which it has given rise; and the varying opinions of accoucheurs of equal experience afford a strong proof of the difficulties surrounding the subject. This remark applies, of course, only to the lesser degrees of deformity, in which the birth of a living child is not hopeless. When the antero-posterior diameter of the brim measures only 3 inches or less, it is universally admitted that the destruction of the child is inevitable, unless the pelvis be so small as to necessitate the performance of the Cæsarean section. But when it is between 3 inches and the normal measurement the comparative merits of the forceps, turning, and the induction of premature labour, form a fruitful theme for discussion. With one class of accoucheurs the forceps are chiefly advocated, and turning admitted as an occasional resource when they have failed; and this indeed, speaking broadly, may be said to have been the

Treatment.

general view held in this country. More recently we find German authorities of eminence, such as Schröder and Spiegelberg, giving turning the chief place, and condemning the forceps altogether in contracted pelvis, or, at least, restricting their use within very narrow limits. More strangely still we find, of late, that the induction of premature labour, on the origination and extension of which British accoucheurs have always prided themselves, is placed without the pale, and spoken of as injurious and useless in reference to pelvic deformities. To see our way clearly amongst so many conflicting opinions is by no means an easy task, and perhaps we may best aid in its accomplishment by considering separately the three operations in so far as they bear on this subject, and pointing out briefly what can be said for and against them.

The
forceps.

In England and in France it is pretty generally admitted that in the slightest degrees of contraction the most reliable means of aiding the patient is the application of the forceps. It should be remembered, that the operation, under such circumstances, is always much more serious than in ordinary labours simply delayed from uterine inertia, when there is ample room, and the head is in the cavity of the pelvis; for the blades have to be passed up very high, often when the head is more or less moveable above the brim, and much more traction is likely to be required. For these reasons artificial assistance, when pelvic deformity is suspected, is not to be lightly or hurriedly resorted to. Nor fortunately is it always necessary; for, if the pains be sufficiently strong, and the contraction not too great to prevent the head engaging at all, after a lapse of time it will become so moulded in the brim as to pass even a considerable obstruction. In all cases, therefore, sufficient time must be given for this; and, if no suspicious symptoms exist on the part of the mother—no elevation of temperature, dryness of the vagina, rapid pulse, and the like, and the foetal heart sounds continue to be normal—labour may be allowed to go on for some hours after the rupture of the membranes, so as to give nature a chance of completing the delivery. When this seems hopeless the intervention of art is called for.

Time
should be
given to
test the
natural
powers.

The forceps are generally considered to be applicable in all degrees of contraction from the standard measurement, down to about 3½ inches in the conjugate of the brim.

There can be no doubt that, in such cases, traction with the forceps often enables us to effect delivery, when the natural efforts have proved insufficient, and holds out a very fair hope of saving the child. Out of 17 cases in which the high forceps operation was resorted to for pelvic deformity, reported by Stanesco, in 13 living children were born. If the length of the labour, and the long-continued compression to which the child had been subjected, be borne in mind, this result must be considered very favourable.

Cases
suitable
for the
forceps.

What are the objections which have been brought against the operation? These have been principally made by Schröder and other German writers. They are, chiefly the difficulty in passing the instrument; the risk of injuring the maternal structures; and the supposition that, as the blades must seize the head by the forehead and occiput, their compressive action will diminish its longitudinal and increase its transverse diameter (which is opposed to the contracted part of the brim), and so enlarge the head just where it ought to be smallest. There is little doubt that these writers much exaggerate the compressive power of the forceps. Certainly with those generally used in this country, any disadvantage likely to accrue from this is more than counterbalanced by the traction on the head; and the fact, that minor degrees of obstruction can be thus overcome, with safety both to the mother and child, is abundantly proved by the numberless cases in which the forceps have been used.

Objections
that have
been raised
to the for-
ceps.

It is very likely that the forceps do not act equally well in all cases. When the head is loose above the brim; when the contraction is chiefly limited to the antero-posterior diameter, and there is abundance of room at the sides of the pelvis for the occiput to occupy after version; and when, as is usual in these cases, the anterior fontanelle is depressed and the head is placed in a very oblique position, it is probable that turning may be the safer operation for the mother, and the easier performed. When, on the other hand, the head has engaged in the brim, and has become more or less impacted, it is obvious that version could not be performed without pushing it back, which may neither be easy nor safe. It is probable also that in the generally contracted pelvis, in which the contraction is not limited to the conjugate diameter, and in which the head enters in an exaggerated state of flexion, the

They are
not equally
suitable in
all kinds
of defor-
mity.

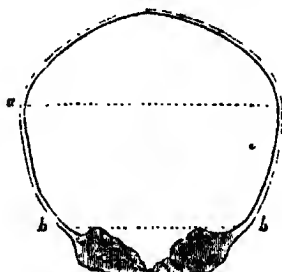
posterior fontanelle being much depressed, that the forceps are more suitable.

Mechanical advantage of turning in certain cases.

The special reasons why version sometimes succeeds when the forceps fail, or why it may be elected from the first as a matter of choice, have been by no one better pointed out than by Sir James Simpson. Although the operation was performed by many of the older obstetricians, its

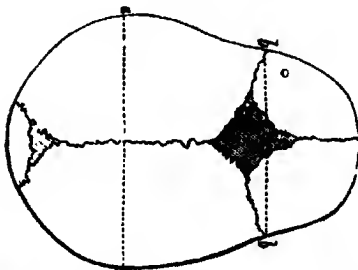
revival in modern times, and the clear enunciation of its principles, can undoubtedly be traced to his writings. He points out that the head of the child is shaped, like a cone, its narrowest portion, the base of the cranium (fig. 131 *bb*), measuring, on an average, from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch less than the broadest portion (fig. 131 *aa*) viz. the bi-parietal diameter. In ordinary head presentations the latter part of the head has to pass first; but if the feet are brought down, the narrow apex of the cranial cone is brought first into apposition with the contracted brim, and can be more easily drawn through than the broader base can be pushed through by the uterine contractions. Nor is this the

Fig. 131.



SECTION OF FETAL CRANIUM, SHOWING ITS CONICAL FORM.

Fig. 132.



SHOWING THE GREATER BREADTH OF THE BI-PARIETAL DIAMETER OF THE FETAL CRANIUM.

only advantage, for after turning the narrower bi-temporal diameter (fig. 132 *bb*)—which measures, on an average, half an inch less than the bi-parietal (fig. 132 *aa*)—is brought into contact with the contracted conjugate, while the broader bi-parietal lies in the comparatively wide space at the side of the pelvis (fig. 133). These mechanical considerations are sufficiently obvious, and fully explain the success which has often attended the performance of the operation.

It is generally admitted that it may be possible, for the reasons just mentioned, to deliver a living child by turning,

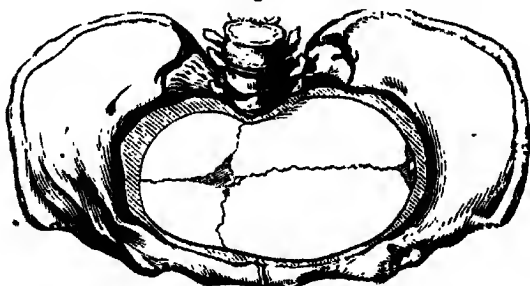
through a pelvis contracted beyond the point which would permit of a living child being extracted by the forceps. Many obstetricians believe that it is possible to deliver a living child by turning in a pelvis contracted even to the extent of $2\frac{1}{2}$ inches in the conjugate diameter. Barnes maintains that, although an unusually compressible head may be drawn through a pelvis contracted to 3 inches, the chance of the child being born alive under such circumstances must necessarily be small, and that from $3\frac{1}{4}$ inches to the normal size must be taken as the proper limits of the operation.

Limits of the operation.

That delivery is often possible by turning, after the forceps and the natural powers have failed, and when no other resource is left but the destruction of the child, must, I think, be admitted by all; for the records of obstetrics are full of

It frequently succeeds when the forceps have failed.

Fig. 133.



SHOWING THE GREATER SPACE FOR THE BI-PARIETAL DIAMETER AT THE SIDE OF THE PELVIS IN CERTAIN CASES OF DEFORMITY.

such cases. To take one example only, Dr. Braxton Hicks records 4 cases in which the forceps were tried unsuccessfully, in all of which version was used, 3 of the children being born alive. Here are the lives of 3 children rescued from destruction, within a short period, in the practice of one man; and a fact like this would, of itself, be ample justification of the attempt to deliver by turning, when the child was known to be alive, and other means had failed. The possibility that craniotomy may still be required, is no argument against the operation; for, although perforation of the after-coming head is certainly not so easy as perforation of a presenting head, it is not so much more difficult as to justify the neglect of an expedient by which it may possibly be altogether avoided.

The original choice of turning is a more difficult question to decide. My own impression is that the for-

Compara-
tive esti-
mate of the
two opera-
tions.

ceps will generally be found to be the preferable operation of the two; except, perhaps, when the head refuses to enter the brim and cannot be sufficiently steadied by external pressure to admit of the easy application of the instrument. An argument used by Martin, of Berlin,¹ in reference to the two operations, should not be lost sight of, as it seems to be a valid reason for giving a preference to the forceps. He points out that moulding may safely be applied for hours to the vertex; but that when pressure is applied to the important structures about the base of the brain, as after turning, moulding cannot be continued beyond five minutes without proving fatal. This, however, is no reason why turning should not be used after the forceps and the natural efforts have proved ineffectual.

Cases in
which
craniotomy
or the
Cæsarean
section is
required.

When the contraction is below 3 inches in the conjugate, or when the forceps and turning have failed, no resource is left but the destruction of the foetus, or the Cæsarean section.

The induc-
tion of
premature

The induction of premature labour as a means of avoiding the risks of delivery at term, and of possibly saving the life of the child, must now be studied. The established rule, in this country, is, that in all cases of pelvic deformity the existence of which has been ascertained either by the experience of former labours, or by accurate examination of the pelvis, labour should be induced previous to the full period, so that the smaller and more compressible head of the premature foetus may pass, where that of the foetus at term could not. The gain is a double one, partly the lessened risk to the mother, and partly the chance of saving the child's life.

Recent
objections
to it.

The practice is so thoroughly recognised as a conservative and judicious one, that it might be deemed unnecessary to argue in its favour, were it not that some most eminent authorities have of late years tried to show, that it is better and safer to the mother to leave the labour to come on at term; and that the risk to the child is so great in artificially induced labour as to lead to the conclusion that the operation should be altogether abandoned, except, perhaps, in the extreme distortion in which the Cæsarean section might otherwise be necessary. Prominent amongst those who hold

¹ *Mon. f. Geburt.* 1867.

these views are Spiegelberg and Litzman, and they have been supported, in a modified form, by Matthews Duncan. Spiegelberg¹ tries to show, by a collection of cases from various sources, that the results of induced labour in contracted pelvis are much more unfavourable than when the cases are left to nature; that in the latter the mortality of the mothers is 6·6 per cent., and of the children 28·7 per cent., whereas in the former the maternal deaths are 15 per cent., and the infantile 66·9 per cent. Litzman² arrives at not very dissimilar results, namely, 6·9 per cent. of the mothers and 20·3 per cent. of the children in contracted pelvis at term, and 14·7 per cent. of the mothers and 55·8 per cent. of the children, in artificially induced premature labour.

If these statistics were reliable, inasmuch as they show a very decided risk to the mother, there might be great force in the argument that it would be better to leave the cases to run the chance of delivery at term. It is, however, very questionable whether they can be taken, in themselves, as being sufficient to settle the question. The fallacy of determining such points by a mass of heterogeneous cases, collected together without a careful sifting of their histories, has over and over again been pointed out; and it would be easy enough to meet them by an equal catalogue of cases in which the maternal mortality is almost nil. The results of the practice of many authorities are given in Churchill's work, where we find, for example, that out of 46 cases of Merriman's, not one proved fatal. The same fortunate result happened in 62 cases of Ramsbotham's. His conclusion is, that 'there is undoubtedly some risk incurred by the mother, but not more than by an accidental premature labour,' and this conclusion, as regards the mother, is that which has long ago been arrived at by the majority of British obstetricians, who undoubtedly have more experience of the operation than those of any other nation. With regard to the child, even if the German statistics be taken as reliable, they would hardly be accepted as contra-indicating the operation, inasmuch as it is intended to save the mother from the dangers of the more serious labour at term, and, in many cases, to give at

¹ *Arch. f. Gyn.* b. i. s. 1.

² *Ib.* b. ii. s. 169.

least a chance to the child, whose life would otherwise be certainly sacrificed. The result, moreover, must depend to a great extent on the method of operation adopted, for many of the plans of inducing labour recommended are certainly, in themselves, not devoid of danger both to the mother and the child. It may, I think, be admitted, as Dr. Duncan contends,¹ that the operation has been more often performed than is absolutely necessary, and that the higher degrees of pelvic contraction are much more uncommon than has been supposed to be the case. That is a very valid reason for insisting on a careful and accurate diagnosis, but not for rejecting an operation which has so long been an established and favourite resource.

Determi-
nation of
period for
inducing
labour.

When the induction of labour has been determined on, the precise period at which it should be resorted to becomes a question for anxious consideration, for the longer it is delayed the greater, of course, are the chances for the child. Many tables have been constructed to guide us on this point, which are not, on the whole, of so much service as they might appear to be, on account of the difficulty of determining with minute accuracy the amount of contraction. The following, however, which is drawn up by Scanzoni, may serve for a guide in settling this question:—

		Inches	Lines		
When the sacro-pubic diameter is 2 and	6 or 7	induce labour at	30th week.		
" "	2 "	8 "	9 "	" "	31st "
" "	2 "	10 "	11 "	" "	32nd "
" "	3 "	—	" "	" "	33rd "
" "	3 "	1 "	" "	" "	33rd "
" "	3 "	2 "	3 "	" "	34th "
" "	3 "	4 "	5 "	" "	35th "
" "	3 "	5 "	6 "	" "	36th "

In cases of moderate deformity, when labour pains have been induced, the further progress of the case may be left to nature; but, in the more marked cases, as in those below 3 inches, it will often be found necessary to assist delivery by turning or by the forceps, the former being here specially useful, on account of the extreme pliability of the head, and the facility with which it may be drawn through the contracted brim. By thus combining the two operations it may be quite possible, as has been well shown by Barnes, to

¹ *Edin. Med. Journ.* July 1873, p. 339.

secure the birth of a living child even in pelves very considerably deformed.

When the contraction is so great as to necessitate the induction of the labour before the sixth month, or in other words, before the child has reached a viable age, it would be preferable to resort to a very early production of abortion. The operation is then indicated, not for the sake of the child, but to save the mother from the deadly risk to which she would otherwise be subjected. As, in these cases, the mother alone is concerned, the operation should be performed as soon as we have positively determined the existence of pregnancy. No object can be gained by waiting until the development of the child is advanced to any extent, and the less the foetus is developed, the less will be the pain and risks the mother has to undergo. There is no amount of deformity, however great, in which we could not succeed in bringing on miscarriage by some of the numerous means at our disposal ; and, in spite of Dr. Radford's objections, who maintains that the obstetrician is not justified in sacrificing the life of a living being more than once, when the mother knows that she cannot give birth to a viable child, there are few practitioners who would not deem it their duty to spare the mother the terrible dangers of the Cesarean section.

Production
of abortion
in extreme
deformity.

CHAPTER XIII.

HÆMORRHAGE BEFORE DELIVERY : PLACENTA PRÆVIA.

THE hæmorrhages which are the result of an abnormal situation of the placenta, partially or entirely, over the internal os uteri, have formed a most fruitful theme for discussion. The causes producing the abnormal placental site, the sources of the blood, and the causes of its escape, the means adopted by nature for its arrest, and the proper treatment, have, each and all of them, been the subject of endless controversies, which are not yet by any means settled. It must be admitted, too, that the extreme importance of the subject amply justifies the attention which has been paid to it; for there is no obstetric complication more apt to produce sudden and alarming effects, and none requiring more prompt and scientific treatment.

Definition By *placenta prævia* we mean the insertion of the placenta at the lower segments of the uterine cavity, so that part of it is situated, wholly or partially, over the internal os uteri. In the former case there is what is talked of by authors as *complete* or *central* placental presentation, in the latter an *incomplete* or *marginal* presentation.

Causes. The causes of this abnormal placental site are not fully understood. It was supposed by Tyler Smith to depend on the ovule not having been impregnated until it had reached the lower part of the uterine cavity. Cazeaux suggests that the uterine mucous membrane is less swollen and turgid than when impregnation occurs at the more ordinary place, and that, therefore, it offers less obstruction to the descent of the ovule to the lower part of the uterine cavity. An abnormal size, or unusual shape, of the uterine cavity may also favour the descent of the impregnated ovule. The former probably explains the fact, that placenta prævia more generally occurs in women who have borne several children. These are

merely interesting speculations having no practical value, the fact being undoubted that, in a not inconsiderable number of cases—estimated by Johnson and Sinclair as 1 out of 573—the placenta is grafted partially or entirely over the uterine orifice.

Placenta prævia was not unknown to the older writers, who believed that the placenta had originally been situated at the fundus, from which it had accidentally fallen to the lower part of the uterus. Portal, Levret, Roederer, and especially our own countryman Rigby, were among those whose observations tended to improve the state of obstetrical knowledge as to its real site. To Rigby we owe the term '*unavoidable hæmorrhage*,' as a synonym for placenta prævia, and as distinguishing hæmorrhage from this source from that resulting from separation of the placenta at its more usual position, termed by him, in contra-distinction, '*accidental hæmorrhage*.' These names, adopted by most writers on the subject, are obviously misleading, as they assume an essential distinction in the etiology of the hæmorrhage in the two classes of cases, which we shall presently find not to be always warranted.

It is of the utmost importance to a right understanding of the nature and treatment of placenta prævia that we should fully understand the source of the hæmorrhage, and the manner of its production; but we shall be able to discuss this subject better after a description of the symptoms.

Although the placenta must occupy its unusual site from the earliest period of its formation, it rarely gives rise to appreciable symptoms before the last three months of utero-gestation. It is far from unlikely, however, that such an abnormal situation of the placenta may produce abortion in the earlier months, the site of its attachment passing unobserved.

The earliest symptom which causes suspicion is the sudden occurrence of hæmorrhage, without any appreciable cause. The amount of blood lost varies considerably. In some cases the first hæmorrhage is comparatively slight, and is soon spontaneously arrested; but, if the case be left to itself, the flow after a lapse of time—it may be a few days, or it may be weeks—again commences in the same unexpected way, and each successive hæmorrhage is more profuse. The losses show themselves at different periods.

Symptoms.

Sudden
flow of
blood.

Frequent unexpected recurrence of the hæmorrhage.

They rarely begin before the end of the sixth month, more often nearer the full period, and sometimes not until labour has actually commenced. The hæmorrhage very often coincides with what would have been a menstrual period; doubtless on account of the physiological congestion of the uterine organs then present. Should the first loss not show itself until at or near the full time, it may be tremendous, and a few moments may suffice to place the patient's life in jeopardy. Indeed it may be safely accepted as an axiom, that once hæmorrhage has occurred the patient is never safe, for excessive losses may occur at any moment without warning, and when assistance is not at hand. It often happens that premature labour comes on after one or more hæmorrhages.

Blood generally escapes more profusely with each pain.

Explanation of this fact.

In any case of placenta prævia, when labour has commenced, whether premature or at the full time, the hæmorrhage may become excessive, and with each pain fresh portions of placenta may be detached, and fresh vessels torn and left open. Under these circumstances the blood often escapes in greater quantity with each successive pain, and diminishes in the intervals. This has long been looked upon as a diagnostic mark by which we can distinguish between the so-called 'unavoidable' and 'accidental' hæmorrhage; in the latter the flow being arrested during the pains. The distinction, however, is altogether fallacious. The tendency of uterine contraction in placenta prævia, as in all other forms of uterine hæmorrhage, is to constrict the vessels from which the blood escapes, and so to lessen the flow. The apparently increased flow during the pains depends on the pains forcing out blood which has already escaped from the vessels. In one way, up to a certain point, the pains certainly do favour hæmorrhage, by detaching fresh portions of placenta; but the actual loss takes place chiefly during the intervals, and not during the continuance of contraction.

Results of vaginal examination.

On vaginal examination, if the os be sufficiently open to admit the finger, which it generally is on account of the relaxation produced by the loss of blood, we shall almost always be able to feel some portion of presenting placenta. If it be a central implantation, we shall find the upper aperture of the cervix entirely covered by the thick, boggy mass

of the placenta, which is to be distinguished from a coagulum occupying the same position by its consistence, and by its not breaking down under the pressure of the finger. Through the placental mass we may be able to feel the presenting part of the foetus, but not as distinctly as when there is no intervening substance. In partial placental presentations the bag of membranes, and above it the head or other presentation, will be found to occupy a part of the circle of the os, the rest being covered by the edge of the placenta. In marginal presentations we may only be able to make out the thickened edge of the after-birth, projecting at the rim of the os. If the cervix be high, and the gestation not advanced to term, these points may not be easy to make out, on account of the difficulty of reaching the cervix; and, as accurate diagnosis is of the utmost importance, it is proper to introduce two fingers, or even the whole hand, so as thoroughly to explore the condition of the parts. The lower portion of the uterine ovoid may be observed to be more than usually thick and fleshy; and Gendrin has pointed out that ballottement cannot be made out. The accuracy of our diagnosis may be confirmed, in doubtful cases, by finding that the placental bruit is heard over the lower part of the uterine tumour.

Dr. Wallace¹ has suggested that vaginal auscultation may be serviceable in diagnosis, and states that, by means of a curved wooden stethoscope, the placental bruit may be heard with startling distinctness. This is, however, a manœuvre that can hardly be generally carried out in actual practice.

It is now pretty generally admitted by authorities that the immediate source of the hæmorrhage is the lacerated utero-placental vessels. Only a few years ago Sir James Simpson advocated, with his usual energy, the theory, sustained by his predecessor Dr. Hamilton, that the chief, if not the only, source of hæmorrhage was the detached portion of the placenta itself. He argued that the blood flowed from the portion of the placenta which was still adherent into that which was separated, and escaped from the surface of the latter; and on this supposition he based his practice of entirely separating the placenta, having observed that, in many cases in which the after-birth had been expelled before the child,

The
source
of hæmor-
rhage.

¹ *Edin. Med. Journ.* Nov. 1872.

the hæmorrhage had ceased. The fact of the cessation of the hæmorrhage, when this occurs, is not doubted; but Simpson's explanation is contested by most modern writers, prominent among whom is Dr. Barnes, who has devoted much study to the elucidation of the subject. He points out that the stoppage of the hæmorrhage is not due to the separation of the placenta, but to the preceding or accompanying contraction of the uterus, which seals up the bleeding vessels, just as it does in other forms of hæmorrhage. The site of the loss was actually demonstrated by the late Dr. Mackenzie in a series of experiments, in which he partially detached the placenta in pregnant bitches, and found that the blood flowed from the walls of the uterus, and not from the detached surface of the placenta. The arrangement of the large venous sinuses, opening as they do on the uterine mucous membrane, favours the escape of blood when they are torn across; and it is from them, possibly to some extent also from the uterine arteries, that the blood comes, just as in post-partum hæmorrhage, when the whole, instead of a part, of the placental site is bared.

Causes of
hæmor-
rhage.

Theory of
Jacque-
mier.

Various explanations have been given of the causes of the hæmorrhage. For long it was supposed to depend on the gradual expansion of the cervix during the latter months of pregnancy, which separated the abnormally placed placenta. It has been seen, however, that this shortening of the cervix is apparent only, and that the cervical canal is not taken up into the uterine cavity during gestation, or, at all events, only during the last week or so. This, therefore, cannot be admitted as an explanation of placental separation. Jacquemier proposed another theory which has been adopted by Cazeaux. He maintains that during the first six months of utero-gestation the superior portion of the uterus is more especially developed, as shown by the pyriform shape of the fundus during that time; and that, as the placenta is usually attached in that situation, and then attains its maximum of development, its relations to its attachments are undisturbed. During the last three months of pregnancy, on the contrary, the lower segment of the uterus develops more than the upper, while the placenta remains nearly stationary in size; the inevitable result being a loss of proportion between the cervix and the placenta, and the détachment of the latter.

There are various objections which can be brought against this theory; the most important being that there is no evidence at all to show that the lower segment of the uterus does expand more in proportion than the upper during the latter months of pregnancy. Dr. Barnes' theory is based on the supposition that the loss of relation between the uterus and placenta is caused by excess of growth on the part of the placenta itself over that of the cervix, which is not adapted for its attachment. The placenta, on this theory, grows away from the site of its attachment, and hæmorrhage results. It will be observed that neither this theory nor that propounded by Jacquemier, are readily reconcilable with the fact that hæmorrhage frequently does not begin until labour has commenced at term. Inasmuch as the loss of relation between the placenta and its attachments, which they both presuppose, must exist in every case of placenta prævia, hæmorrhage should always occur during some part of the last three months of pregnancy. Dr. Matthews Duncan¹ has recently investigated the whole subject at length, and maintains that the hæmorrhages are accidental, not unavoidable, being due to precisely similar causes as those which give rise to the occasional hæmorrhages when the placenta is normally placed. The abnormal situation of the placenta, of course, renders these causes more apt to operate; but in their action he believes them to be precisely similar to those of accidental hæmorrhage, properly so called. Separation of the placenta from expansion of the cervix, he believes to be the cause of hæmorrhage after labour has begun, and then it may strictly be called unavoidable; but hæmorrhage is comparatively seldom so produced during the continuance of pregnancy. 'There are,' says Duncan, 'four ways in which this kind of hæmorrhage may occur:

Theory of
Barnes.

Theory of
Matthews
Duncan.

1. By the rupture of a utero-placental vessel at or above the internal os uteri.

2. By the rupture of a marginal utero-placental sinus within the area of spontaneous premature detachment, when the placenta is inserted not centrally or covering the internal os, but with a margin at or near the internal os.

3. By partial separation of the placenta from accidental causes, such as a jerk or fall.

¹ *Edin. Med. Journ.* Nov. 1873, and *Brit. Med. Journ.* Nov. 1873.

‘4. By a partial separation of the placenta, the consequence of uterine pains producing a small amount of dilatation of the internal os. Such cases may be otherwise described as instances of miscarriage commencing, but arrested at a very early stage.’

I see no reason to doubt the possibility of hæmorrhage being due, in many cases, to the first three causes, and in its production it would strictly resemble accidental hæmorrhage. The fourth heading refers the hæmorrhage to partial separation, in consequence of commencing dilatation of the cervix, but it explains the dilatation by the supposition of commencing miscarriage. This latter hypothesis seems to be as needless as those which presuppose a want of relation between the placenta and its attachments. We know that, quite independently of commencing miscarriage, uterine contractions are constantly occurring during the continuance of pregnancy. This has been conclusively shown by Braxton Hicks, and anyone can readily ascertain the fact by keeping his hand for a few minutes on a pregnant uterus. There is no reason to suppose that these contractions do not affect the cervical, as well as the fundal portions of the uterus; and it is easy to understand how, in cases in which the placenta is situated partially or entirely over the os, one or more stronger contractions than usual may, at any moment, produce laceration of the placental attachments in that neighbourhood.

Pathological changes in the placenta.

In cases of placenta prævia a careful examination of the placenta may show pathological changes at the site of separation, such as have been described by Gendrin, Simpson, and other writers. These probably consist of thrombosis in the placental cotyledons, with effused blood clots, variously altered and discoloured, according to the lapse of time since separation took place. Authors have also described changes as occurring in the portion of the placenta overlying the os uteri, whether separation has occurred or not. There appears to be a tendency to atrophy of the placental structure in this situation, as well as to changes of form, such as complete or partial separation into two lobes, the junction of which overlies the os uteri.¹

Mode in which labour is

The history of delivery, if left to nature, is specially worthy of study as guiding to proper rules of treatment in

¹ Sinelius, *Arch. Gen. de Méd.* vol. ii. 1861.

these anxious cases. It sometimes happens, when the pains are very strong and the delivery rapid, that labour is completed without any hæmorrhage of consequence. 'Although,' says Cazèaux, 'hæmorrhage is usually considered to be inevitable under such circumstances, yet it may not appear even during the labour; and the dilatation of the os uteri may be effected without the loss of a drop of blood.' Again, Simpson conclusively showed, by a large number of cases, that when the placenta was expelled before the birth of the child, all hæmorrhage ceased.

terminated
naturally
when the
placenta
presents.

Barnes's theory of placenta prævia, which has been pretty generally adopted, explains satisfactorily both these classes of cases.

Barnes's
theory.

He describes the uterine cavity as divisible into three zones or divisions. When the placenta is situated in the upper or middle of these zones, no separation or hæmorrhage need occur during labour. When, however, it is situated partially or entirely in the lower or cervical zone, the expansion of the cervix during labour must produce more or less separation of, and consequent loss of blood. As soon as the previous portion of the placenta is sufficiently separated, provided contraction of the uterine tissue be present to seal up the mouths of the vessels, hæmorrhage no longer takes place. The placenta may not be entirely detached, but no farther hæmorrhage occurs, in consequence of the remaining portion being engrafted on the uterus beyond the region of unsafe attachment.

In the former, then, of these classes of cases, the absence of hæmorrhage is explained, on this theory, by the pains being sufficiently rapid and strong to complete the separation of the placental attachment from the lower cervical zone before flooding had taken place; in the latter, it ceases, not necessarily because the entire placenta is expelled, but because of its detachment from the area of dangerous implantation.

The amount of cervical expansion required for this purpose varies in different cases. Dr. Duncan¹ has studied this point accurately, and estimates the limit of the spontaneous detaching area to be a circle of $4\frac{1}{2}$ inches diameter, and that, after the cervix has expanded to that extent, no further separation of the placenta or hæmorrhage takes place. To admit

¹ *Obstet. Trans.* vol. xv.

of the passage of a full-sized head, Barnes estimates that expansion to about a circle of 6 inches is necessary; on the other hand he has sometimes observed 'that the hæmorrhage has completely stopped when the os uteri had opened to the size of the rim of a wineglass, or even less.'

It will be seen then that in this, as in every other form of puerperal hæmorrhage, the tendency of uterine contraction is to check the hæmorrhage; and that, provided the pains are sufficiently energetic, nature may be capable of stopping the flooding without artificial aid. It is but rarely, however, that she can be trusted for the purpose; and we shall presently see that these theoretical views have an important practical bearing on the subject of treatment.

Prognosis.

The prognosis to both the mother and child is certainly grave in all cases of placenta prævia. Read, in his treatise on placenta prævia, estimates the maternal mortality, from the statistics of a large number of cases, as 1 in $4\frac{1}{2}$ cases, and Churchill as 1 in 3. This is unquestionably too high an estimate, and based on statistics, the accuracy of which cannot be relied on. The mortality will, of course, greatly depend on the treatment adopted. Doubtless, if cases were left to nature, the result would be quite as unfavourable as Read supposes. But, if properly managed, much more successful results may safely be anticipated. Out of 64 cases, recorded by Barnes, the deaths were 6, or 1 in $10\frac{2}{3}$. Under any circumstances the risks to the mother must be considered to be very great. Churchill estimates that more than half the children are lost. The reasons for the great danger to the child are very obvious, subjected as it is to the risk of asphyxia, from the loss of the maternal blood, and from its respiration being carried on during the continuance of labour, by a placenta which is only partially attached; many children also perish from prematurity, or from mal-presentation.

Treatment.

Whenever, in the latter months of pregnancy, a sudden hæmorrhage occurs, the possibility of placenta prævia will naturally suggest itself; and, by a careful vaginal examination, which under such circumstances should always be insisted on, the existence of this complication will generally be readily ascertained. It is seldom that the os is not sufficiently dilated to enable us to satisfy ourselves whether the placenta is presenting.

The first question that will arise is, are we ~~we~~ justified in temporising, using means to check the hæmorrhage, and allowing the pregnancy to continue? This is the course which has generally been recommended in works on midwifery. We are told to place the patient on a hard mattress, not to heat or overburden her with clothes, to keep her absolutely at rest, to have the room cool and well aired, to apply cold cloths to the vulva and lower part of the abdomen; to administer cold and acidulated drinks in abundance, and to prescribe acetate of lead and opium, or gallic acid, on account of their supposed hæmostatic effect. Of late years the judiciousness of these recommendations has been strongly contested. Not long ago an interesting discussion took place at the Obstetrical Society of London,¹ on a paper in which Dr. Greenhalgh advised the immediate induction of labour in all cases of placenta prævia. No less than six metropolitan teachers of midwifery took part in it; and, although they differed in details, they all agreed as to the unadvisability of allowing pregnancy to progress when the existence of placenta prævia had been distinctly ascertained. The reasons for this course are obvious and unanswerable. The labour, indeed, very often comes on of its own accord; but should it not do so, the patient's life must be considered to be always in jeopardy until the case is terminated, for no one can be sure that most dangerous, or even fatal, flooding may not at any moment come on; and the nearer to term the patient is, the greater the risk to which she is subjected. Nor is the safety of the child likely to be increased by delay. Provided it has arrived at a viable age, the chances of its being born alive may be said to be greater if pregnancy be terminated at once, than if repeated floodings occur. I think, therefore, that it may be safely laid down as an axiom, that no attempt should be made to prevent the termination of pregnancy, but that our treatment should rather contemplate its conclusion as soon as possible. An exception may, however, be made to this rule when the hæmorrhage occurs for the first time before the seventh month of utero-gestation. The chances of the child surviving would then be very small, and if the hæmorrhage be not alarming, as at that early period is likely to be the case, the measures indicated above may be employed, in the hope of carrying on the

Is it justifiable to allow the pregnancy to continue?

¹ *Obst. Trans.* vol. vi. p. 188.

pregnancy until there is a prospect of the patient being delivered of a living child. But little benefit is likely to accrue from astringent drugs. Perfect rest in bed is more likely to be beneficial than anything else; and astringent vaginal pessaries, of matico or perchloride of iron, might be used with advantage as local hæmostatics.

Various
methods of
treatment.

When the period of pregnancy, or the urgency of the case, determine us to forego any attempt at temporising, there are various plans of treatment to be considered. These are chiefly—1. *Puncture of the membranes.* 2. *Plugging the vagina.* 3. *Turning.* 4. *Partial or complete separation of the placenta.* It will be well to consider in detail the relative advantages of, and indications for, each of these. It is seldom, however, that we can trust to any one *per se*; in most cases two or more require to be used in combination.

Puncture
of mem-
branes.

1. Puncture of the membranes is recommended by Barnes as the first measure to be adopted in all cases of placenta prævia, sufficient to cause anxiety. 'It is,' he says, 'the most generally efficacious remedy, and it can always be applied.' The primary object gained is the increase of uterine contraction, by the evacuation of the liquor amnii. Although the first effect of this may be to increase the flow of blood by further separation of the placenta, the flooding can be generally commanded by plugging, until the os is sufficiently dilated to permit the passage of the child. As a rule, there is no great difficulty in effecting the puncture, especially if the placental presentation be only partial. A quill, or other suitable contrivance, guided by the examining finger, is passed through the cervix, and pushed through the membranes. In complete placenta prævia it may not be so easy to effect the evacuation of the liquor amnii; and, although many authorities advise the penetration of the substance of the placenta itself, I am inclined to think that it would be better to abandon the attempt, in such cases, and trust to other methods of treatment.

The objections which have been raised to puncture of the membranes are chiefly, that it interferes with the gradual dilatation of the os, and renders the operation of turning much more difficult. The os is not, however, so regularly dilated by the bag of membranes in cases of placenta prævia, as it is in ordinary labours. Moreover, the cervical tissues are generally

relaxed by the hæmorrhage, and dilatation is easily effected. Should we desire to dilate the os, preparatory to turning, we can readily do so by means of Barnes' bags, which act, at the same time, as an efficient plug. The objections, therefore, are not so weighty as they might have been before these artificial dilators were used. I am inclined, for these reasons, to agree with the recommendation that puncture of the membranes should be resorted to in all cases of placenta prævia.

2. Plugging of the vagina, or, still better, of the cavity of the cervix itself, is specially serviceable in cases in which the os is not sufficiently dilated to admit of turning, or of separation of the placenta, and in which the hæmorrhage still continues after the evacuation of the liquor amnii. By means of this contrivance the escape of blood is effectually controlled.

Plugging
of the
vagina.

The best way of plugging is to introduce a sponge tent of sufficient size into the cervical canal, and to keep it *in situ* by a vaginal plug; the best material for the latter, and the method of introduction, are described under the head of abortion (vol. i., p. 287). The sponge tent not only controls the hæmorrhage more effectually than any other means, but is, at the same time, effecting dilatation of the cervix. If preferred, a Barnes' bag may be used for the same purpose. Any form of plug can only be used as a temporary expedient. It cannot be left in many hours on account of the irritation produced, and of the fetor from accumulating vaginal discharges. As long as it is in position, we should carefully examine, from time to time, to see that no blood is oozing past it, which is very apt to occur.

While the plug is *in situ*, other modes of exciting uterine action may be very advantageously employed, such as a firm, abdominal bandage, occasional friction over the uterus, and repeated doses of ergot. The last is specially recommended by Dr. Greenhalgh, who uses, at the same time, a plug formed of an oblong india-rubber ball, inflated with air, and covered with spongio-piline.

On the removal of the plug we may find that considerable dilatation has taken place, perhaps to a sufficient extent to admit of labour being safely concluded by the natural efforts. In that case we shall find that, although the pains

continue, no fresh hæmorrhage occurs. Should it do so, it will be necessary to adopt further measures.

Turning.

3. Turning has long been considered *the* remedy *par excellence* in placenta prævia; and it is of unquestionable value in suitable cases. Much harm, however, has been done when it has been practised before the os was sufficiently dilated to admit of the passage of the hand, or when the patient was so exhausted by previous hæmorrhage as to be unable to bear the shock of the operation. The records of many fatal cases in the practice of those who taught, as did the large majority of the older writers, that turning at all risks was essential, conclusively prove this assertion.

It is most likely to prove serviceable when, either at first, or after the use of the tampon, the os is sufficiently dilated to admit the hand, and when the strength of the patient is not much enfeebled. If she have a small, feeble, and thready pulse, it is certainly inapplicable, unless all other methods of arresting the hæmorrhage have failed. And, even then, it would be well to attempt to rally the patient from her exhausted state by stimulants, &c., before the operation is commenced.

Provided the placental presentation be partial, the operation can be performed without difficulty in the usual way. In central implantation the passage of the hand may give rise to some difficulty. Dr. Rigby recommends that it should be pushed through the substance of the placenta, until it reaches the uterine cavity. It is hardly possible to conceive how this could be done without completely detaching the placenta, and still less to understand how the fœtus could be dragged through the aperture thus made. It will be far better to pass the hand by the border of the placenta, separating it as we do so; and, if we can ascertain to which side of the cervix it is least attached, that should be chosen for the purpose. In all cases in which it is possible; turning by the bi-polar method should be preferred. In cases of placenta prævia especially it offers many advantages. The operation can be sooner performed; complete dilatation of the os is not so necessary; and it involves less bruising of the cervix, which is likely to be specially dangerous. When once a foot has been brought within the os, the delivery need not be hurried. The foot forms a plug, which effectually prevents all further loss; and we may then safely wait until we can excite uterine

contraction, and terminate the labour with safety. Fortunately, the relaxation of the uterus, which is so often present, facilitates this manner of performing version, and it can generally be successfully accomplished. Should the case be one which is otherwise suitable for turning, and the requisite amount of dilatation of the cervix not be present, the latter can generally be effected in the space of an hour or more (while at the same time a farther loss of blood is effectually prevented) by the use of Barnes' bags.

Entire separation of the placenta was originally recommended by Simpson in his well-known paper on the subject. The reasons which induced him to recommend it have already been stated. It is a mistake to suppose, however, as is so often done, that he intended to recommend it in all cases alike. This supposition he always was careful to deny. He advised it especially :—

Separation
of the
placenta.

1. When the child is dead.
2. When the child is not yet viable.
3. When the hæmorrhage is great and the os uteri is not yet sufficiently dilated for safe turning. This was the state in 11 out of 35 cases (Lee).
4. When the pelvic passages are too small for safe and easy turning.
5. When the mother is too exhausted to bear turning.
6. When the evacuation of the liquor amnii fails.
7. When the uterus is too firmly contracted for turning.¹

These are very much the cases in which all modern accoucheurs would exclude the operation of turning; and it was especially when that was unsuitable that Simpson advised extraction of the placenta. As his theory of the source of hæmorrhage is now almost universally disbelieved, so has the practice based on it fallen into disuse, and it need not be discussed at length. It is very doubtful whether the complete separation and extraction of the placenta was a feasible operation; unquestionably it can be by no means so easy as Simpson's writings would lead us to suppose. The introduction of the hand far enough to remove the placenta in an exhausted patient would probably cause as much shock as the operation of turning itself; and another very formidable

¹ *Selected Obstet. Works*, p. 68.

objection to the procedure is, the almost certain death of the child, if any time elapse between the separation of the placenta and the completion of delivery. The modification of this method, so strongly advocated by Barnes, is certainly much easier of application, and would appear to answer every purpose that Simpson's operation effected. It is impossible to describe it better than in Barnes' own words:¹

'The operation is this: Pass one or two fingers as far as they will go through the os-uteri, the hand being passed into the vagina if necessary; feeling the placenta, insinuate the finger between it and the uterine wall; sweep the finger round in a circle so as to separate the placenta as far as the finger can reach; if you feel the edge of the placenta, where the membranes begin, tear open the membranes carefully, especially if these have not been previously ruptured; ascertain, if you can, what is the presentation of the child before withdrawing your hand. Commonly, some amount of retraction of the cervix takes place after the operation, and often the hæmorrhage ceases.'

It will be seen from what has been said that no one rule of practice can be definitely laid down for all cases of placenta prævia. Our treatment in each individual case must be guided by the particular conditions that are present; and, if only we bear in mind the natural history of the hæmorrhage, we may confidently look to a favourable termination.

It may be useful, in conclusion, to recapitulate the rules which have been laid down for treatment in the form of a series of propositions:

Summary
of rules for
treatment.

I. Before the child has reached a viable age, temporise, provided the hæmorrhage be not excessive, until pregnancy has advanced sufficiently to afford a reasonable hope of saving the child. For this purpose the chief indication is absolute rest in bed, to which other accessory means of preventing hæmorrhage, such as cold, astringent pessaries, etc., may be added.

II. In hæmorrhage occurring after the seventh month of utero-gestation, no attempt should be made to prolong the pregnancy.

III. In all cases in which it can be easily effected the membranes should be ruptured. By this means uterine

¹ *Obstet. Operations*, 2nd ed. p. 417.

contractions are favoured, and the bleeding vessels compressed.

IV. If the hæmorrhage be stopped, the case may be left to nature. If flooding continue, and the os be not sufficiently dilated to admit of the labour being readily terminated by turning, the os and the vagina should be carefully plugged, while uterine contractions are farther promoted by abdominal bandages, uterine compression, and ergot. The plug must not be left in beyond a few hours. -

V. If, on removal of the plug, the os be sufficiently expanded, and the general condition of the patient be good, the labour may be terminated by turning, the bi-polar method being used if possible. If the os be not open enough, it may be advantageously dilated by a Barnes' bag, which also acts as a plug.

VI. Instead of, or before resorting to, turning, the placenta may be separated around the site of its attachment to the cervix. This practice is especially to be preferred when the patient is much exhausted, and in a condition unfavourable for bearing the shock of turning.

CHAPTER XIV.

HÆMORRHAGE FROM SEPARATION OF A NORMALLY SITUATED PLACENTA.

Definition. THIS is the form of hæmorrhage which is generally described in obstetric works as "*accidental*," in contra-distinction to the "*unavoidable*" hæmorrhage of placenta prævia. In discussing the latter, we have seen that the term '*accidental*' is one that is apt to mislead, and that the causation of the hæmorrhage in placenta prævia is, in some cases at least, closely allied to that of the variety of hæmorrhage we are now considering.

When, from any cause, separation of a normally situated placenta occurs before delivery, more or less blood is necessarily effused from the ruptured utero-placental vessels, and the subsequent course of the case may be twofold. 1. The effused blood, or at least some part of it, may find its way between the membranes and the decidua, and escape from the os uteri. This constitutes the typical '*accidental*' hæmorrhage of authors. 2. The blood may fail to find a passage externally, and may collect internally, giving rise to very serious symptoms, and even proving fatal, before the true nature of the case is recognised. Cases of this kind are by no means so rare as the small amount of attention paid to them by authors might lead us to suppose; and, from the obscurity of the symptoms and difficulty of diagnosis, they merit special study. Dr. Goodell¹ has collected together no less than 106 instances in which this complication occurred.

Causes and pathology.

The causes of placental separation may be very various. In a large number of cases it has followed an accident or exertion (such as slipping down stairs, stretching, lifting heavy weights, and the like), which has probably had the effect of lacerating some of the placental attachments. At other

¹ *Amer. Journ. of Obst.* vol. ii,

times it has occurred without such appreciable cause, and then it has been referred to some change in the uterus, such as a more than usually strong contraction producing separation, or some accidental determination of blood causing a slight extravasation between the placenta and the uterine wall, the irritation of which leads to contraction and farther detachment. We may safely assume that causes such as these, which are of daily occurrence in pregnancy, will not produce detachment except in women otherwise predisposed to it. It generally is met with in women who have borne many children, more especially in women of weakly constitution and impaired health, and rarely in primiparæ. Certain constitutional states probably predispose to it, such as albuminuria, or exaggerated anæmia; and, still more so, degenerations and diseases of the placenta itself.

This form of hæmorrhage rarely occurs to an alarming extent until the latter months of pregnancy, often not until labour has commenced. The great size of the placental vessels in advanced pregnancy affords a reasonable explanation of this fact.

If, after separation of a portion of the placenta, the blood find its way between the membranes and the decidua, its escape per vaginam, even although in small amount, at once attracts attention, and reveals the nature of the accident. It is otherwise when we have to do with a case of concealed hæmorrhage, the diagnosis of which is often a matter of difficulty. Then the blood probably at first collects between the uterus and the placenta. Sometimes marginal separation does not occur, and large blood clots are formed in this situation, and retained there. More often, the margin of the placenta separates, and the blood collects between the membranes and the uterine wall, either towards the cervix, where the presenting part of the child may prevent its escape, or near the fundus. In the latter case especially, the coagula are apt to cause very painful stretching and distension of the uterus. The blood may also find its way into the amniotic cavity, but more frequently it does not do so; probably, as Goodell has pointed out, because 'should the os uteri be closed, the membranes, however delicate, cannot, other things being equal, rupture any sooner from the uterine walls, for the sum of the resistance of the enclosed liquor amnii being equally distri-

Symp-
toms and
diagnosis.

buted exactly counterbalances the sum of the pressure exerted by the effusion.' This point is of some practical importance because, after rupture of the membranes, the liquor amnii is frequently found untinged with blood, and this might lead us to suppose ourselves mistaken in our diagnosis, if this fact were not borne in mind.

Symptoms
of conceal-
ed acciden-
tal hæmorr-
hage.

The most prominent symptoms in concealed internal hæmorrhage are extreme collapse and exhaustion of the patient, for which no adequate cause can be assigned. These differ from those of ordinary syncope, with which they might be confounded, chiefly in their persistence and severity, and in the presence of the symptoms attending severe loss of blood, such as coldness and pallor of the surface, great restlessness and anxiety, rapid and sighing respiration, yawning, feeble, quick, and compressible pulse. When there is severe internal, with slight external, hæmorrhage, we may be led to a proper diagnosis by observing that the constitutional symptoms are much more severe than the amount of external hæmorrhage would account for. Uterine pain is generally present, of a tearing and stretching character, sometimes moderate in amount, more often severe, and occasionally amounting to intolerable anguish. It is often localised, and it, doubtless, depends on the distension of the uterus by the retained coagula. If the distension be marked, there may be an irregularity in the form of the uterus at the site of sanguineous effusion; but this will be difficult to make out, except in women with thin and unusually lax abdominal parietes. A rapid increase in the size of the uterus has been described as a sign by Cazeaux and others. It is not very likely that this will be appreciable towards the end of utero-gestation, when a very large amount of effusion would be necessary to produce it. At an earlier period of pregnancy, at or about the fifth month, I made it out very distinctly in a case in my own practice. It obviously must have occurred to an enormous extent in a case related by Chevalier, in which post-mortem Cæsarean section was performed under the impression that the pregnancy had advanced to term, but only a three months foetus was found, imbedded in coagula which distended the uterus to the size of a nine months' gestation.¹ Labour pains may be entirely

¹ *Journ. de Méd. Clig. et Pharmac.* vol. xxi. p. 363.

absent. If present, they are generally feeble, irregular, and inefficient.

The only condition, besides ordinary syncope, that is likely to be confounded with this form of hæmorrhage, is rupture of the uterus, to which the intense pain and profound collapse induce considerable resemblance. The latter rarely occurs until after labour has been some time in progress, and after the escape of the liquor amnii; whereas hæmorrhage usually occurs either before labour has commenced, or at an early stage. The recession of the presentation, and the escape of the fœtus into the abdominal cavity, in cases of rupture, will further aid in establishing the diagnosis.

Differential
diag-
nosis.

The prognosis, when blood escapes externally, is, on the whole, not unfavourable. The nature of the case is apparent, and remedial measures are generally adopted sufficiently early to prevent serious mischief. It is different with the concealed form, in which the mortality is very great. Out of Goodell's 106 cases, no less than 54 mothers died. This excessive death rate is, no doubt, partly due to the fact that extreme prostration so often occurs before the existence of hæmorrhage is suspected; and partly to the accident generally happening in women of weakly and diseased constitution. The prognosis to the child is still more grave. Out of 107 children, only 6 were born alive. The almost certain death of the child may be explained by the fact, that when blood collects between the uterus and the placenta, the fœtal portion of the latter is probably lacerated, and the child then also dies from hæmorrhage.

Prognosis.

In this, as in all other forms of puerperal hæmorrhage, the great hæmostatic is uterine contraction, and that we must try to encourage by all possible means. The first thing to be done, whether the hæmorrhage be apparent or concealed, is to rupture the membranes. If the loss of blood be only slight, this may suffice to control it, and the case may then be left to nature. A firm abdominal binder should, however, be applied to prevent any risk of blood collecting internally, as there is nothing to prevent its filling the uterine cavity after the membranes are ruptured. Contraction may be further advantageously solicited by uterine compression, and by the administration of full doses of ergot. If hæmorrhage continue, or if we have any reason to suspect concealed hæmor-

Treat-
ment.

rhage, the sooner the uterus is emptied the better. If the os be sufficiently dilated, the best practice will be to turn without further delay, using the bi-polar method if possible. If the os be not open enough, a Barnes' bag should be introduced, while firm pressure is kept up to prevent uterine accumulation. Should the collapsed condition of the patient be very marked, the mere shock of the operation might turn the scale against her. Under such circumstances it may be better practice to delay further procedure until, by the administration of stimulants, warmth, &c., we have succeeded in producing some amount of reaction, keeping up, in the meanwhile, firm pressure on the uterus. Should the head be low down in the pelvis, it may be easier to complete labour by means of the forceps.

CHAPTER XV.

HÆMORRHAGE AFTER DELIVERY.

HÆMORRHAGE during, or shortly after, the third stage of labour is well known to be one of the most trying and dangerous accidents connected with parturition. Its sudden and unexpected occurrence just after the labour appears to be happily terminated, and its alarming effect on the patient, who is often placed in the utmost danger in a few moments, tax the presence of mind and the resources of the practitioner to the utmost, and render it an imperative duty on everyone who practises midwifery to make himself thoroughly acquainted with its causes, and preventive and curative treatment. There is no emergency in obstetrics which leaves less time for reflection and consultation, and the life of the patient will often depend on the prompt and immediate action of the medical attendant.

Its importance.

Post-partum hæmorrhage is one of the most frequent complications of delivery. I do not know of any statistics which enable us to judge with accuracy of its frequency, but I believe it to be an unquestionable fact that, especially in the upper ranks of society, it is very common indeed. This is probably due to the effects of civilisation, and to the mode of life of patients of that class, whose whole surroundings tend to produce a lax habit of body which favours uterine inertia, the principal cause of post-partum hæmorrhage.

Frequency of post-partum hæmorrhage.

Fortunately, it is, to a great extent, a preventible accident. I believe this fact cannot be too strongly impressed on the practitioner. If the third stage of labour be properly conducted, if every case be treated, as every case ought to be, as if hæmorrhage were impending, it would be much more infrequent than it is. It is a curious fact that post-partum hæmorrhage is much more common in the practice of some medical men than in that of others; the reason being, that

Generally a preventible accident.

those who meet with it often are careless in their management of their patients immediately after the birth of the child. That is just the time when the assistance of a properly qualified practitioner is of value, much more so than before the second stage of labour is concluded; hence when I hear that a medical man is constantly meeting with severe post-partum hæmorrhage, I hold myself justified '*ipso facto*' in inferring that, he does not know, or does not practise, the proper mode of managing the third stage of labour.

Causes.

Nature's
method of
controlling
hæmor-
rhage after
delivery.

The placenta, as we have seen, is separated by the last pains, and the blood, which in greater or less quantity accompanies the foetus, probably comes from the utero-placental vessels which are then lacerated. Almost immediately afterwards the uterus contracts firmly, and, in a typical labour, assumes the hard cricket-ball form which is so comforting to the accoucheur to feel. The result is the compression of all the vascular trunks which ramify in its walls, both arteries and veins, and thus the flow of blood through them is prevented. By referring to what has been said as to the anatomy of the muscular fibres of the gravid uterus, especially at the placental site (vol. i. p. 37), it will be seen how admirably they are adapted for this purpose. The arrangement of the vessels themselves favours the hæmostatic action of uterine contraction. The large venous sinuses are placed in layers, one above the other, in the thickness of the uterine walls, and they anastomose freely. When the superimposed layers communicate with those immediately below them, the junction is by a falciform or semilunar opening in the floor of the vessel nearest the external surface of the uterus. Within the margins of this aperture there are muscular fibres, the contraction of which probably tends to prevent retrogression of blood from one layer of vessels into the other. The venous sinuses themselves are of a flattened form, and they are intimately attached to the muscular tissues. It is obvious, then, that these anatomical arrangements are eminently adapted to facilitate the closure of the vessels. They are, however, large, and are destitute of valves; and, if contraction be absent, or if it be partial and irregular, it is equally easy to understand why blood should pour forth in the appalling amount which is sometimes observed.

If uterine action be firm, regular, and continuous, the vessels must be sealed up, and hæmorrhage effectually prevented. This fact has been doubted by many authorities. Gooch was the first to describe what he called 'a peculiar form of hæmorrhage' accompanying a contracted womb, and similar observations have been made by other writers, such as Velpeau, Rigby, and Gendrin. Simpson says, on this point, that strong uterine contractions 'are not probably so essential a part in the mechanism of the prevention of hæmorrhage from the open orifices of the uterine veins as we might *a priori* suppose.'¹ With regard to Gooch's cases, it has been pointed out that his own description proves that, however firmly the uterus may have contracted immediately after the expulsion of the child, it must have subsequently relaxed, for he passed his hand into it to remove retained clots, a manœuvre which he could not have practised had tonic contraction been present. Barnes suggests that in some of these cases the hæmorrhage came from a laceration of the cervix. Of course, blood may readily escape from a mechanical injury of this kind, although the uterus itself be in a satisfactory state of contraction, and the possibility of this occurrence should always be borne in mind.

Importance of tonic uterine contraction.

Although, then, we may admit that post-partum hæmorrhage is incompatible with persistent contraction of the uterus, it by no means follows that the converse is true. On the contrary, it is not uncommon to meet with cases in which the uterus is large and apparently quite flaccid, and in which there is no loss of blood. Alternate relaxation and contraction of the uterus after delivery are also of constant occurrence, and yet hæmorrhage, during the relaxation, does not take place. The explanation no doubt is that, immediately after the birth of the child, there was sufficient contraction to prevent hæmorrhage, and that, during its continuance, coagula formed in the mouths of the uterine sinuses, by which they were sufficiently occluded to prevent any loss when subsequent relaxation occurred.

Thrombosis in the vessels as a hæmostatic.

In all probability both uterine contraction and thrombosis are in operation in ordinary cases; and we shall presently see that all the means employed in the treatment of post-partum hæmorrhage act by producing one or other of them.

¹ *Selected Obstet. Works*, p. 234

Secondary
causes of
hæmor-
rhage.

Uterine inertia after labour, then, may be regarded as the one great primary cause of post-partum hæmorrhage; but there are various secondary causes which tend to produce it, one of the most frequent of which is exhaustion following a protracted labour. The uterus gets worn out by its efforts, and when the foetus is expelled, it remains in a relaxed state, and hæmorrhage results. Over-distension of the uterus acts in the same way. Hence hæmorrhage is very frequently met with when there has been an excessive amount of liquor amnii, or in multiple pregnancies. One of the worst cases I ever met with was after the birth of triplets, the uterus having been of an enormous size. Rapid emptying of the uterus, during which there has not been sufficient time for complete separation of the placenta, often tends to the same result. This is the reason why hæmorrhage so frequently follows forceps delivery, especially if the operation have been unduly hurried; and it is one of the chief dangers in what are termed 'precipitate labours.' The general condition of the patient may also strongly predispose to it. Thus it is more often met with in women who have borne families, especially if they be weakly in constitution, comparatively seldom in primiparae; and for the same reason that after-pains are most common in the former, namely that the uterus, weakened by frequent child-bearing, contracts inefficiently. The experience of practitioners in the tropics shows that European women, debilitated by the relaxing effects of warm climates, are peculiarly prone to it, and it forms one of the chief dangers of child-birth amongst the English ladies in India.

Irregular
uterine
contrac-
tion.

Another important cause of post-partum hæmorrhage is partial and irregular contraction of the uterus. Part of the muscular tissue is firmly contracted, while another part is relaxed, and the latter very often the placental site. This has been especially dwelt on by Simpson. He says 'the morbid condition which is most frequently and earliest seen in connection with post-partum hæmorrhage, is a state of irregularity and want of equability in the contractile action of different parts of the uterus—and, it may be in different planes of the muscular fibres—as marked by one or more points in the organ feeling hard and contracted, at

the same time that other portions of the parietes are soft and relaxed.'

One peculiar variety, which has been much dwelt on by writers, and is a prominent bugbear to obstetricians, is the so-called '*hour-glass contraction*.' This in reality seems to depend on spasmodic contraction of the internal os uteri, by means of which the placenta becomes encysted in the upper portion of the uterus, which is relaxed. On introducing the hand, it first passes through the lax cervical canal, until it comes to the closed internal os, with the umbilical cord passing through it, which has generally been

Hour-glass contraction.

Fig. 134.



IRREGULAR CONTRACTION OF THE UTERUS, WITH ENCYSTMENT OF THE PLACENTA.

supposed to be a circular contraction of a portion of the body of the uterus.

Encystment of the placenta, however, although more rarely, unquestionably takes place in a portion only of the body of the uterus (fig. 134). Then apparently the placental site remains more or less paralysed, with the placenta still attached, while the remainder of the body of the uterus contracts firmly, and thus encystment is produced.

These irregular contractions of the uterus are by no means so common as our older authors supposed. When they do occur I believe them almost invariably to depend on defective management of the third stage of labour. 'The most frequent cause,' says Rigby,¹ 'is from over-anxiety to remove the placenta; the cord is frequently pulled at, and at length the os

Causes of irregular contractions.

¹ Rigby's *Midwifery*, p. 225.

uteri is excited to contract.' While this is being done no attempts are probably being made to excite the fundus to proper action, and, therefore, the hour-glass contraction is established. Duncan says of this condition: 'Hour-glass contraction cannot exist unless the parts above the contraction are in a state of inertia; were the higher parts of the uterus even in moderate action, the hour-glass contraction would soon be overcome.'¹ If placental expression were always employed, if it were the rule to effect the expulsion of the placenta by a *vis a tergo*, instead of extracting by a *vis a fronte*, I feel confident that these irregular and spasmodic contractions—of the influence of which in producing hæmorrhage there can be no question—would rarely, if ever, be met with. It is to be observed that even in these cases it is not because the uterus is in a state of partial contraction, but because it is in a state of partial relaxation, that hæmorrhage ensues.

Placental
adhesion.

Adhesions of the placenta to the uterine parietes may cause hæmorrhage, especially if they be partial, and the remainder of the placenta be also detached. The frequency of these has been over-estimated. Many cases believed to be examples of adherent placenta are, in reality, only cases of placenta retained from uterine inertia. The experience of all who see much midwifery will probably corroborate the observation of Braun, that 'abnormal adhesion and hour-glass contraction are more frequently encountered in the experience of the young practitioner, and they diminish in frequency in direct ratio to increasing years.'² The cause of adhesion is often obscure, but it most probably results from a morbid state of the decidua, which is produced by antecedent disease of the uterine mucous membrane; then the adhesion is apt to recur in subsequent pregnancies. The decidua is altered and thickened, and patches of calcareous and fibrous degeneration may be often found on the attached surface of the placenta. Most frequently the placenta is only partially adherent; patches of it remain firmly attached to the uterus, while the rest is separated; hence the uterine walls remain relaxed, and hæmorrhage frequently follows. The diagnosis and management of these very troublesome cases will be found described under the head of treatment (p. 109).

¹ *Researches in Obstetrics*, p. 389.

² Braun's *Lectures*, 1869.

Finally I think it must be admitted that there are some women who really merit the appellation of 'Flooders,' which has been applied to them, and who, do what we may, have the most extraordinary tendency to hæmorrhage after delivery. I do not think that these cases, however, are by any means so common as some have supposed. I have attended several patients who have nearly lost their lives from post-partum hæmorrhage in former labours, ~~some~~ who had suffered from it in every preceding confinement, and I have only met with two cases in which the assiduous use of preventive treatment failed to avert it. In these (one of which I have elsewhere published in detail¹), in spite of all I could do, I could not succeed in keeping up uterine contraction, and the patients would certainly have lost their lives were it not for the means which modern improvements have fortunately placed at our disposal for producing thrombosis in the mouths of the bleeding vessels. The nature of these rare cases requires further investigation; possibly they may, to some extent, be the subjects of the so-called hæmorrhagic diathesis.

Constitutional predisposition to flooding.

The loss of blood may commence immediately after the birth of the child, before the expulsion of the placenta, or not until some time afterwards, when the contracted uterus has again relaxed. It may commence gradually, or suddenly; in the latter case, it may begin with a gush, and in the worst form the bed-clothes, the bed, and even the floor, are deluged with the blood which, it is no exaggeration to say, is pouring from the patient. If now the hand be placed on the abdomen, we shall miss the hard round ball of the contracted uterus, which will be found soft and flabby, or we may even be unable to make out its contour at all. If the hæmorrhage be slight, or if we succeed in controlling it at once, no serious consequences follow; but if it be excessive, or if we fail to check it, the gravest results ensue.

Signs and symptoms.

There are few sights more appalling to witness than one of the worst cases of post-partum hæmorrhage. The pulse becomes rapidly affected, and may be reduced to a mere thread, or it may become entirely imperceptible. Syncope often comes on, not in itself always an unfavourable occurrence, as it tends to promote thrombosis in the venous sinuses. Or, short of actual syncope, there may

Exhaustion in extreme cases.

¹ *Obst. Journ.* vol. i.

be a feeling of intense debility and faintness. Extreme restlessness soon supervenes, the patient throws herself about the bed, tossing her arms wildly above her head; respiration becomes gasping and sighing, the 'besoin de respirer' is acutely felt, and the patient cries out for more air; the skin becomes deadly cold, and covered with profuse perspiration; if the hæmorrhage continue unchecked, we next may have complete loss of vision, jactitation, convulsions, and death.

Formidable as such symptoms are, it is satisfactory to know that recovery often takes place, even when the powers of life seem reduced to the lowest ebb. If we can check the hæmorrhage while there is still some power of reaction left, however slight, we may not unreasonably hope for eventual recovery. The constitution, however, may have received a severe shock, and it may be months, or even years, before the patient recovers from the effects of only a few minutes' hæmorrhage. A death-like pallor frequently follows these excessive losses, and the patient often remains blanched and exsanguine for a long time.

Preventive
treatment.

The preventive treatment of post-partum hæmorrhage should be carefully practised in every case of labour, however normal. If the practitioner make a habit of never removing his hand from the uterus after the birth of the child until the placenta is expelled, and of keeping up continuous uterine contraction for at least half an hour after delivery is completed, not necessarily by friction on the fundus, but by simply grasping the contracted womb with the palm of the hand and preventing its undue relaxation, cases of post-partum flooding will seldom be met with. As a rule we should, I think, not apply the binder until at least that time has elapsed. The binder is an effective means of keeping up, but not of producing, contraction, and it should never be trusted to for the latter purpose. If it be put on too soon, the uterus may relax under it, and become filled with clots without the practitioner knowing anything about it; whereas this cannot possibly take place as long as the uterine globe is held in the hollow of the hand. I have seen more than one serious case of concealed hæmorrhage result from the too common habit of putting on the binder immediately after the removal of the placenta. I believe

also, as I have formerly said, that it is thoroughly good practice to administer a full dose of the liquid extract of ergot in all cases after the placenta has been expelled, to ensure persistent contraction, and to lessen the chances of blood clots being retained in utero.

These are the precautions which should be used in all cases alike; but when we have reason to fear, from the history of previous labours or other cause, the occurrence of hæmorrhage, special care should be taken. The ergot should be given before the birth of the child, when the presentation is so far advanced that we estimate that labour will be concluded in from ten to twenty minutes, as we can hardly expect the drug to produce any effect in less time. Particular attention, moreover, should then be paid to the state of the uterus. Every means should be taken to ensure regular and strong contraction, and it is advisable to rupture the membranes early, as soon as the os is dilated or dilatable, to ensure stronger uterine action. If any tendency to relaxation occur after delivery, a piece of ice should be passed into the vagina, or even into the uterine cavity itself. Should coagula collect in the uterus, they may be readily expelled by firm pressure on the fundus, and the finger should be passed occasionally up to the cervix, and any which are felt there should be gently picked away.

We should be specially on our guard in all cases in which the pulse does not fall after delivery. If it beat at 100 or more some ten minutes or a quarter of an hour after the birth of the child, hæmorrhage not unfrequently follows; and, hence, it is a good practical rule, which may save much trouble, that a patient should never be left unless the pulse has fallen to its natural standard.

As there are only two means which nature adopts in the prevention of post-partum hæmorrhage, so the remedial measures also may be divided into two classes. 1. Those which act by the production of uterine contraction. 2. Those which act by producing thrombosis in the vessels. Of these the first are the most commonly used; and it is only in the worst cases, in which they have been assiduously tried and have failed, that we resort to those coming under the second heading.

Curative
treatment.

The patient should be placed on her back, in which

Uterine
pressure.

position we can more readily command the uterus, as well as attend to her general state. If the uterus be found relaxed and full of clots, by firmly grasping it in the hand contraction may be evoked, its contents expelled, and further hæmorrhage at once arrested. Should this fortunately be the case, we must keep up contraction by gently kneading the uterus, until we are satisfied that undue relaxation will not recur. The powerful influence of friction in promoting contraction cannot be doubted, and nothing will replace it; no doubt it is fatiguing, but as long as it is effectual it must be kept up. No roughness should be used, as we might produce subsequent injury, but it is quite possible to use considerable pressure without any violence.

Another method of applying uterine pressure has been very strongly advocated by Dr. Hamilton, of Falkirk, and it may be serviceable where there is a constant draining from the uterus, and a capacious pelvis. It consists in passing the fingers of the right hand high up in the posterior cul de sac of the vagina, so as to reach the posterior surface of the uterus, while counter-pressure is exercised by the left hand through the abdomen. The anterior and posterior walls of the uterus are thus closely pressed together.

Admini-
stration of
ergot.

During the time that pressure is being applied, attention can be paid to general treatment; and in giving his directions to the bystanders the practitioner should be calm and collected, avoiding all hurry and excitement. A full dose of ergot should be administered, and if one have already been given, it should be repeated. We cannot, however, look upon ergot as anything but a useful accessory, and it is one which requires considerable time to operate.

Stimu-
lants.

The sudden flow will probably have produced exhaustion and a tendency to syncope, and the administration of stimulants will be necessary. The amount must be regulated by the state of the pulse, and the degree of exhaustion. There is no more absurd mistake, however, than implicitly relying on the brandy bottle to check post-partum hæmorrhage. In the worst cases absorption is in abeyance, and brandy may be poured down in abundance, the practitioner believing that he is rousing his patient, while he is, in fact, merely filling the stomach with a quantity of fluid, which is eventually thrown up unaltered. I have more than once seen symptoms, produced

from the over-free use of brandy in slight floodings, which were certainly not those of hæmorrhage. I remember on one occasion being summoned by a practitioner, with a view to transfusion, to a patient who was said to be insensible and collapsed from hæmorrhage. I found her, indeed, unconscious, but with a flushed face, a bounding pulse, a firmly contracted uterus, and deep stertorous breathing. On enquiry I ascertained that she had taken an enormous quantity of brandy, which had brought on the coma of profound intoxication, while the hæmorrhage had obviously never been excessive.

The windows should be thrown widely open, to allow a current of fresh cold air to circulate freely through the room. The pillows should be removed, the head kept low, and the patient should be assiduously fanned.

Fresh air,
&c.

If bleeding continue, or if it commence before the placenta is expelled, the hand should be carefully and gently passed into the uterus, and its cavity cleared of its contents. The mere presence of the hand within the uterus is a powerful incitor of uterine action. When the placenta is retained it is the more essential, as the hæmorrhage cannot possibly be checked as long as the uterus is distended by it. During the operation the uterus should be supported by the left hand externally, and, by using the two hands in concert, the chances of injuring the textures are greatly lessened.

Emptying
of uterus.

If the so-called 'hour-glass contraction' be present, or if the placenta be morbidly adherent, the operation will be more difficult, and will require much judgment and care. The spasmodic contraction of the inner os in the former case may generally be overcome by gentle and continuous pressure of the fingers passed within the contraction, while the uterus is supported from without. By this means, too, further hæmorrhage can in most cases be controlled, until the spasm is sufficiently relaxed to admit of the passage of the hand.

Treatment
of hour-
glass con-
traction.

There are no very reliable signs to indicate morbid adhesion of the placenta, previous to the introduction of the hand. The following are the symptoms as laid down by Barnes, any of which might, however, accompany non-detachment of the placenta, unaccompanied by adhesion: 'You may suspect morbid adhesion, if there have been

Signs of
adherent
placenta.

unusual difficulty in removing the placenta in previous labours; if, during the third stage, the uterus contracts at intervals firmly, each contraction being accompanied by blood, and yet, on following up the cord, you feel the placenta *in utero*; if on pulling on the cord, two fingers being pressed into the placenta at the root, you feel the placenta and uterus descend in one mass, a sense of dragging pain being elicited; if, during a pain the uterine tumour does not present a globular form, but be more prominent than usual at the place of placental attachment.'¹

Treatment
of adherent
placenta.

The artificial removal of an adherent placenta is always a delicate and anxious operation, which, however carefully performed, must of necessity expose the patient to the risk of injury to uterine structures, and leaving behind portions of placental structure, which may give rise to secondary hæmorrhage, or septicæmia. The cord will guide the hand to the site of attachment, and the fingers must be very gently insinuated between the lower edge of the placenta and the uterine wall; or, if a portion be already detached, we may commence to peel off the remainder at that spot. Supporting the uterus externally, we carefully pick off as much as possible, proceeding with the greatest caution, as it is by no means easy to distinguish between the placenta and the uterus. At the best it is far from easy to remove all, and it is wiser to separate only what we readily can, than to make too protracted efforts at complete detachment.

Excite-
ment of
reflex ac-
tion by
cold, &c.

Various means are used for exciting uterine contraction by reflex stimulation. Amongst the most important of these is the action of cold. In patients who are not too exhausted to respond to the stimulus applied, it is of extreme value. But, to be of use, it should be used intermittently, and not continuously. Pouring a stream of cold water from a height on the abdomen is a not uncommon, but bad, practice, as it deluges the patient and the bedding in water, which may afterwards act injuriously. Flapping the lower part of the abdomen with a wet towel is less objectionable. Ice can generally be obtained, and a piece should be introduced into the uterus. This is a very powerful hæmostatic, and often excites powerful action when other means fail. I constantly employ it, and have never seen any bad results

¹ *Obstetric Operations*, p. 440.

follow. A large piece of ice may also be held over the fundus, and removed, and re-applied from time to time. Iced water may be injected into the rectum. A very powerful remedy is washing out the uterine cavity with a stream of cold water, by means of the vaginal pipe of a Higginson's syringe carried up to the fundus. All these remedies, however, depend for their good results on the fact of the patient being in a condition to respond to stimulus; and their too prolonged use, if they fail to excite contraction rapidly, will certainly prove injurious. Rigby used to look upon the application of the child to the breast as one of the most certain incitors of uterine action. It may be of service, after the immediate hæmorrhage has been checked, in keeping up tonic contraction, and should therefore not be omitted; but we certainly cannot waste time in inducing the child to suck in the face of the actual emergency.

The state of the bladder should always be looked to. The late Dr. Earle pointed out¹ that a distended bladder often prevents contraction, and to avoid the possibility of this the catheter should be passed.

State of
the
bladder.

Plugging of the vagina has often been used. It is only necessary to mention it for the purpose of insisting on its absolute inapplicability in all cases of post-partum hæmorrhage; the only effect it could have would be, to prevent the escape of blood externally, which might then collect to any extent in the cavity of the uterus.

Plugging
the vagina.

Compression of the abdominal aorta is highly thought of by many continental authorities, but is little known or practised in this country. It has been objected to by some on the theoretical ground that the hæmorrhage is chiefly venous, and not arterial, and that it would only favour the reflux of venous blood into the vena cava. Cazeaux very justly points out that, on account of the close anatomical relations between the aorta and the vena cava, it is hardly possible to compress one vessel without the other. The backward flow of blood, therefore, through the vena cava may also be thus arrested. There is strong evidence in favour of the occasional utility of compression. Its chief recommendation is, that it can be practised immediately, and by an assistant who can be shown how to apply the pressure. It is most

Compres-
sion of
abdominal
aorta.

¹ Earle's *Flooding after Delivery*, p. 163.

likely to prove useful in sudden and severe hæmorrhage, and, even if it only control the loss for a few moments, it gives us time to apply other methods of treatment. As a temporary expedient, therefore, it should be borne in mind, and adopted when necessary. It has the great advantage of supplementing, without superseding, other and more radical plans of treatment. The pressure is very easily applied, on account of the lax state of the abdominal walls. The artery can readily be felt pulsating above the fundus uteri, and can be compressed against the vertebræ by three or four fingers applied lengthways. Baudelocque, who was a strong advocate of this procedure, states that he has on several occasions controlled an otherwise intractable hæmorrhage in this way, and that he, on one occasion, kept up compression for four consecutive hours. Cazeaux believes that compression of the aorta may have a farther advantageous effect in retaining the mass of the blood in the upper part of the body, and thus lessening the tendency to syncope and collapse. If an aortic tourniquet, such as is used for compressing the vessel in cases of aneurism, could be obtained, it might be used with advantage in serious cases.

Injection
of styptics.

Supposing all these means fail, and the uterus obstinately refuses to contract in spite of all our efforts—and, do what we may, cases of this kind will occur—the only other agent at our command is the application of a powerful styptic to the bleeding surface to produce thrombosis in the vessels. ‘The latter,’ says Dr. Ferguson,¹ alluding to this means of arresting hæmorrhage, ‘appears to be the sole means of safety in those cases of intense flooding in which the uterus flaps about the hand like a wet towel. Incapable of contraction for hours, yet ceasing to ooze out a drop of blood, there is nothing apparently between life and death but a few soft coagula plugging up the sinuses.’ These form but a frail barrier indeed, but the experience of all, who have used the injection of a solution of perchloride of iron in such cases, proves that they are thoroughly effectual, and its introduction into practice is one of the greatest improvements in modern midwifery. Although this method of treating these obstinate cases is not new, since it was practised long ago

¹ Preface to Gooch *On Diseases of Women*, p. xlii.

in Germany, its adoption in this country is unquestionably due to the energetic recommendation of Dr. Barnes. Although the dangers of the practice have been strongly insisted on, and with a degree of acrimony that is to be regretted, no one has yet brought forward any cases in which its evil effects have been conclusively proved. Its extraordinary power, however, of instantly checking the most formidable hæmorrhage has been demonstrated, by the unanimous testimony of all who have tried it. As it is not proposed by anyone that this means of treatment should be employed until all methods of evoking contraction have failed, and as, in cases of this kind, the lives of the patients are of necessity imperilled, we should be fully justified in adopting it, even if its possible injurious effects had been much more certainly proved. It is surely at any time justifiable to avoid a great and pressing peril by running a possible chance of a less one. Whenever, therefore, we have tried all the plans above indicated in vain, no time should be lost in resorting to this expedient. No practitioner should attend a case of midwifery without having the necessary styptic with him. The best and most easily obtainable form of using the remedy is the 'liquor ferri perchloridi' of the London Pharmacopœia, which should be diluted for use with six times its bulk of water. This is certainly better than a weaker solution. The vaginal pipe of a Higginson's syringe, through which the solution has once or twice been pumped to exclude the air, is guided by the hand to the fundus uteri, and the fluid injected gently over the uterine surface. The loose and flabby mucous membrane is instantaneously felt to pucker up, all the blood with which the fluid comes in contact is coagulated, and the hæmorrhage is immediately arrested. I think it is of importance to make sure that the uterus and vagina are emptied of clots before injection. In the only case in which I have seen any bad symptoms follow, this precaution had been neglected. The iron hardened all the coagula, which remained in utero, and septicæmia supervened; which, however, disappeared after the clots had been broken up and washed away by intra-uterine antiseptic injections. After we have resorted to this treatment, all further pressure on the uterus should be stopped. We must remember that we have

now abandoned contraction as an hæmostatic, and are trusting to thrombosis, and that pressure might detach and lessen the coagula which are preventing the escape of blood.

Other local astringents may be eventually found to be of use. Tincture of matico possibly might be serviceable, although I am not aware that it has been tried. Dupierris has advocated the use of tincture of iodine, and has recorded 24 cases in which he employed it, in all without accident and with a successful issue. But nothing seems likely to act so immediately, or so effectually, as the perchloride of iron.

Hæmorrhage from laceration of maternal structures.

A word may here be said as to the occasional dependence of hæmorrhage after delivery on laceration of the cervix, or other accidental injury to the maternal soft parts. Duncan has narrated a case in which the bleeding came from a ruptured perinæum. If hæmorrhage continue after the uterus is permanently contracted, a careful examination should be made to ascertain if any such injury exist. Most generally it will be found that the source of bleeding is the cervix, and the flow can be readily arrested by swabbing the injured textures with a sponge saturated in a solution of the perchloride.

Secondary treatment.

The secondary treatment of post-partum hæmorrhage is of importance. When reaction commences, a train of distressing symptoms often show themselves, such as intense and throbbing headache, great intolerance of light and sound, and general nervous prostration; and, when these have passed away, we have to deal with the more chronic effects of profuse loss of blood. Nothing is so valuable in relieving these symptoms as opium. It is the best restorative that can be employed, but it must be administered in larger doses than usual. Thirty to forty drops of Battley's solution should be given by the mouth, or in an enema. At the same time the patient should be kept perfectly still and quiet, in a darkened room, and the visits of anxious friends strictly forbidden. Strong beef essence, or gravy soup, milk, or eggs beat up with milk, and similar easily absorbed articles of diet, should be given frequently, and in small quantities at a time. Stimulants will be required according to the state of the patient, such as warm brandy and water, port wine, &c. Rest in bed should be insisted on, and continued much beyond the usual time. Eventually the remedies which act by promoting the formation of blood, such as the various preparations of iron,

will be found useful, and may be required for a length of time.

Under the head of transfusion I have separately treated the application of that last resource in those desperate cases, in which the loss of blood has been so excessive as to leave no other hope.

Transfu-
sion.

In the majority of cases, if a few hours have elapsed after delivery without hæmorrhage, we may consider the patient safe from the accident. It is by no means very rare, however, to meet with even profuse losses of blood coming on in the course of convalescence, at a time varying from a few hours, or days, up to several weeks after delivery. These cases are described as examples of '*secondary hæmorrhage*,' and they have not received at all an adequate amount of attention from obstetric writers, inasmuch as they often give rise to very serious, and even fatal, results, and are always somewhat obscure in their etiology, and difficult to treat. We owe almost all our knowledge of this condition to an excellent paper by Dr. McClintock, of Dublin, who has collected characteristic examples from the writings of various authors, and accurately described the causes which are most apt to produce it.

Secondary
post-
partum
hæmor-
rhage.

We must, in the first place, distinguish between true secondary hæmorrhage and profuse lochial discharge, continued for a longer time than usual. The latter is not a very uncommon occurrence, and is generally met with in cases in which involution of the uterus has been checked; as by too early exertion, general debility, and the like. The amount of the lochial discharge varies in different women. In some patients it habitually continues during the whole puerperal month, and even longer, but not to an extent which justifies us in including it under the head of hæmorrhage. In such cases prolonged rest, avoidance of the erect posture, occasional small doses of ergot, and, it may be, after the lapse of some weeks, astringent injections of oak bark, or alum, will be all that is necessary in the way of treatment.

Profuse
lochial
discharge.

True secondary hæmorrhage ~~is often sudden in its appearance and serious in its effects.~~ McClintock mentions 6 fatal cases, and Mr. Bassett, of Birmingham,¹ has recorded

¹ *Brit. Med. Journ.* 1872.

13 examples which came under his own observation, 2 of which ended fatally.

The causes are either constitutional or lochial.

The causes may be either constitutional, or some local condition of the uterus itself.

General causes.

Among the former are such as produce a disturbance of the vascular system of the body generally, or of the uterine vessels in particular. The state of the uterine sinuses, and the slight barrier which the thrombi formed in them offers to the escape of blood, readily explain the fact of any sudden vascular congestion producing hæmorrhage. Thus mental emotions, the sudden assumption of the erect posture, any undue exertion, the incautious use of stimulants, loaded condition of the bowels, or sexual intercourse shortly after delivery, may act in this way. McClintock records the case of a lady in whom very profuse hæmorrhage occurred on the twelfth day after labour, when sitting up for the first time. Feeling faint after suckling, the nurse gave her some brandy, whereupon a gush of blood ensued, 'deluging all the bed clothes and penetrating through the mattress so as to form a pool on the floor.' Here the erect position, the exquisite pain caused by nursing, and the stimulating drink, all concurred to excite the hæmorrhage. In another instance the flooding was traced to excitement produced by the sudden return of an old lover on the eighth day after labour. Morcau especially dwells on the influence of local congestion produced by a loaded condition of the rectum. Constitutional affections producing general debility, and an impoverished state of the blood, probably also may have the same effect. Blot specially mentions albuminaria as one of these, and Saboia states that in Brazil secondary hæmorrhage is a common symptom of miasmatic poisoning, and can only be cured by change of air and the free use of quinine.¹

Local causes.

Local conditions seem, however, to be more frequent factors in the production of secondary hæmorrhage. These may be generally classed under the following heads:—

1. Irregular and inefficient contraction of the uterus.
2. Clots in the uterine cavity.
3. Portions of retained placenta or membranes.
4. Retroflexion of the uterus.
5. Laceration or inflammatory state of the cervix.

¹ Saboia, *Traité des Accouchements*, p. 819.

6. Thrombosis or hæmatocele of the cervix or vulva.
7. Inversion of the uterus.
8. Fibroid tumours or polypus of the uterus.

The first four of these need only now be considered, the others being described elsewhere.

Relaxation of the uterus and distension of its cavity by coagula, may give rise to hæmorrhage, although not so readily as immediately after delivery, for coagula of considerable size are often retained in utero for many days after labour. The uterus will be found larger than it ought to be, and tender on pressure. Usually the coagula are expelled with severe after-pains; but this may not take place, and hæmorrhage may ensue several days after delivery. Or there may be only a relaxed state of the uterus without retained coagula. Bassett relates 4 cases traced to these causes, and several illustrations will be found in McClintock's paper. Portions of retained placenta or membranes are more frequent causes. The retention may be due to carelessness on the part of the practitioner, especially if he have removed the placenta by traction, and failed to satisfy himself of its integrity. It may, however, often be due to circumstances entirely beyond his control; such as adherent placenta, which it is impossible to remove without leaving portions in utero, or more rarely placenta succenturia. In the latter case there is a small supplementary portion of placental tissue developed entirely separate from the general mass, and it may remain in utero without the practitioner having the least suspicion of its existence. Portions of the membranes are very apt to be left in utero. It is to prevent this that they should be twisted into a rope, and extracted very gently after expression of the placenta. Hæmorrhage from these causes generally does not occur until at least a week after delivery, and it may not do so until a much longer time has elapsed. In 4 cases, recorded by Mr. Bassett, it commenced on the twelfth, tenth, fourteenth, and thirty-second day. It may come on suddenly and continue; or it may stop, and recur frequently at short intervals. In my experience retention of portions of the placenta is very common after abortion, when adhesions are more generally met with than at term. In addition to the hæmorrhage there is often a foetid discharge,

Relaxation
of, and
clots in,
the uterus.

Portions of
retained
placenta or
mem-
branes.

due to decomposition of the retained portion, and possibly more less marked septicæmic symptoms, which may aid in the diagnosis. The placenta or membranes may simply be lying loose as foreign bodies in the uterine cavity; or they may be organically attached to the uterine walls, when their removal will not be so easily effected.

Retro-
flexion.

Barnes has specially pointed out the influence of retro-flexion of the uterus in producing secondary hæmorrhage,¹ which seems to act by impeding the circulation at the point of flexion, and thus arresting the process of involution.

Treat-
ment.

In every case in which secondary hæmorrhage occurs to any extent careful investigation into the possible causes of the attack, and an accurate vaginal examination, are imperatively required. If it be due to general and constitutional causes only, we must insist on the most absolute rest on a hard bed in a cool room, and on the absence of all causes of excitement. The liquid extract of ergot will be very generally useful in 3j doses repeated every six hours. McClintock strongly recommends the tincture of Indian hemp, which may be advantageously combined with the ergot, in doses of 10 or 15 minims, suspended in mucilage. Astringent vaginal pessaries of matieo or perchloride of iron may be used. Special attention should be paid to the state of the bowels, and, if the rectum be loaded, it should be emptied by enemata. In more chronic cases a mixture of ergot, sulphate of iron, and small doses of sulphate of magnesia, will prove very serviceable. This is more likely to be effectual when the bleeding is of an atonic and passive character. McClintock also speaks strongly in favour of the application of a blister over the sacrum. When the hæmorrhage is excessive, more effectual local treatment will be required. Cazcaux advises plugging of the vagina. Although this cannot be considered so dangerous as immediately after delivery, inasmuch as the uterus is not so likely to dilate above the plug, still it is certainly not entirely without risk of favouring concealed internal hæmorrhage. If it be used at all, a firm abdominal pad should be applied, so as to compress the uterus; and the abdomen should be examined, from time to time, to ensure against the possibility of uterine dilatation. With these precautions the plug may prove of real value. In any case of really alarming

¹ *Obstetric Operations*, p. 492.

hæmorrhage I should be disposed rather to trust to the application of styptics to the uterine cavity. The injection of fluid in bulk, as after delivery, could not be safely practised, on account of the closure of the os and the contraction of the uterus. But there can be no objection to swabbing out the uterine cavity with a small piece of sponge attached to a handle, and saturated in a solution of the perchloride of iron. There are few cases which will resist this treatment.

If we have reason to suspect retained placenta or membranes, or if the hæmorrhage continue or recur after treatment, a careful exploration of the interior of the womb will be essential. On vaginal examination, we may possibly be able to feel a portion of the placenta protruding through the os, which can then be removed without difficulty. If the os be closed, it must be dilated with sponge¹ or laminaria tents, or by a small-sized Barnes' bag, and the uterus can then be thoroughly explored. This ought to be done under chloroform, as it cannot be effectually accomplished without introducing the whole hand into the vagina, which necessarily causes much pain. If the placenta or membranes be loose in the uterine cavity, they may be removed at once; or, if they be organically attached, they may be carefully picked off. The uterus should at the same time, and as long as the os remains patulous, be thoroughly washed out with Condyl's fluid and water, to diminish the risk of septicæmia.

Retroflexion can readily be detected by vaginal examination, and the treatment consists in careful reposition with the hand, and the application of a large-sized Hodges' pessary.

CHAPTER XVI.

RUPTURE OF THE UTERUS, ETC.

Its fatal-
ity.

Is of un-
frequent
occurrence.

RUPTURE of the uterus is one of the most dangerous accidents of labour, so much so, that until of late years it has been considered almost necessarily fatal, and beyond the reach of treatment. Fortunately it is not of very frequent occurrence; although the published statistics vary so much that it is by no means easy to arrive at any conclusion on this point. The explanation is, no doubt, that many of the tables confound partial and comparatively unimportant lacerations of the cervix and vagina, with rupture of the body and fundus. It is only in large lying-in institutions, where the results of cases are accurately recorded, that anything like reliable statistics can be gathered, for in private practice the occurrence of so lamentable an accident is likely to remain unpublished. To show the difference between the figures given by authorities, it may be stated that, while Burns calculates the proportion to be 1 in 940 labours, Ingleby fixes it as 1 in 1,300 or 1,400, Churchill as 1 in 1,331, and Lehmann as 1 in 2,433. Amongst the most recent writers on the subject is Dr. Jolly, of Paris, who has published an excellent thesis containing much valuable information.¹ He finds that out of 782,741 labours, 230 ruptures, excluding those of the vagina or cervix, occurred, that is 1 in 3,403.

Seat of
Rupture.

Lacerations may occur in any part of the uterus, the fundus, the body, or the cervix. Those of the cervix are comparatively of small consequence, and occur, to a slight extent, in almost all first cases. Only those which involve the supra-vaginal portion of the cervix are of really serious import. Ruptures of the upper part of the uterus are much less frequent than of the portion near the cervix; partly, no doubt, because the fundus is beyond the reach of

¹ *Rupture uterine pendant le Travail*, Paris, 1873.

the mechanical causes to which the accident can, not unfrequently, be traced, and partly because the lower third of the organ is apt to be compressed between the presenting part and the bony pelvis. The site of placental insertion is said by Madame La Chapelle to be rarely involved in the rupture, but it does not always escape, as numerous recorded cases prove. The most frequent seat of rupture is near the junction of the body and neck, either anteriorly or posteriorly, opposite the sacrum, or behind the symphysis pubis, but it may occur at the sides of the lower segment of the uterus. In some cases the entire cervix has been torn away, and separated in the form of a ring.

Most frequent near the junction of the body and cervix.

The laceration may be partial or complete; the latter being the more common. It may happen that the muscular tissue alone is torn, the peritoneal coat remaining intact; or the converse may occur, and then the peritoneum is often fissured in various directions, the muscular coat being unimplicated. The extent of the injury is very variable; in some cases being only a comparatively slight tear, in others forming a large aperture, sufficiently extensive to allow the whole of the uterine contents to pass into the abdominal cavity. The direction of the laceration is as variable as the size, but it is more frequently vertical than either transverse or oblique. On post-mortem examination the edges of the tear will be found to be irregular and jagged; probably on account of the contraction of the muscular fibres, which are frequently softened, infiltrated with blood, and even gangrenous. Large quantities of extravasated blood will be found in the peritoneal cavity; such hæmorrhage, indeed, being one of the most important sources of danger.

Rupture may be partial or complete.

The causes are generally, and with great propriety, divided into *predisposing* and *exciting*; and the progress of modern research tends more and more to show the importance of the former, and to lead to the conclusion that the cause which leads to the laceration could only have operated because the tissue of the uterus was in a state predisposed to rupture, and that it would have had no such effect on a perfectly healthy organ. What these predisposing changes are, and how they operate, is yet far from being known, and the subject offers a fruitful field for pathological investigation.

Causes are either predisposing or exciting.

Said to be
more com-
mon in
multiparæ.

It is generally believed that lacerations are more common in multiparæ than in primiparæ. Tyler Smith contends that this view is erroneous, and that ruptures are relatively as common in first as in subsequent labours. Statistics are by no means sufficiently accurate or extensive to justify a positive conclusion, but it is reasonable to suppose that the pathological changes, presently to be mentioned as predisposing to laceration, are more likely to be met with in women whose uteri have frequently undergone the alteration attendant on repeated pregnancies. Age seems to have considerable influence, as a large proportion of cases have occurred in women between thirty and forty years of age.

Age of the
patients.

Alterations in the
tissues of
the uterus.

Alterations in the tissues of the uterus are probably of very great importance in predisposing to the accident, although our information on this point is far from accurate. Among these are morbid states of the muscular fibres, the result of blows or contusions during pregnancy; premature fatty degeneration of the muscular tissues, an anticipation, as it were, of the normal involution after delivery; fibroid tumours, or malignant infiltration of the uterine walls, which either produce a morbid state of the tissues, or act as an impediment to the expulsion of the uterine contents. The importance of such changes has been specially dwelt on by Murphy in this country, and by Lehmann in Germany, and it is impossible not to concede their probable influence in favouring laceration. It must be admitted, however, that, as yet, these views are founded more on reasonable hypothesis than on accurately observed pathological facts.

Want of
proper pro-
portion
between
child and
pelvis.

Deformity
in pelvis is
a frequent
cause.

Another and very important class of predisposing causes are circumstances which lead to a want of proper proportion between the pelvis and the foetus.

Deformity of the pelvis has long been known to be very frequently met with in cases in which the uterus has ruptured, and its importance can be seen from the fact that out of 19 cases, carefully recorded by Radford,¹ the pelvis was contracted in 11, or more than one-half. Radford makes the curious observation that ruptures seem more likely to occur when the deformity is only slight; and he explains this by supposing that in slight deformities the lower segment of the uterus engages in the brim, and is, therefore, much subjected to com-

¹ *Obst. Trans.* vol. viii.

pression, while in extreme deformity the os and cervix uteri are always situated above the brim, the body and fundus of the uterus hanging down between the thighs of the mother. This explanation is reasonable; but it must not be forgotten that the rarity with which ruptured uterus is associated with extreme pelvic deformity, may rather depend on the infrequency of such advanced degrees of contraction.

Amongst causes of disproportion depending on the foetus are either malpresentation, in which the pains cannot effect expulsion, or undue size of the presenting part. In the latter way may be explained the observation that rupture is much more frequently met with male than with female children, on account, no doubt, of the larger size of the head in the former. The influence of intra-uterine hydrocephalus was first prominently pointed out by Sir James Simpson,¹ who states that out of 74 of cases of intra-uterine hydrocephalus the uterus ruptured in 16. In all such cases of disproportion, whether referable to the pelvis or foetus, rupture is produced in a twofold manner, either by the excessive and fruitless uterine contractions, which are induced by the efforts of the organ to overcome the obstacle; or by the compression of the uterine tissue between the presenting part and the bony pelvis, leading to inflammation, softening, and even gangrene.

Malpresentation or undue size of foetus.

The proximate cause of rupture may be classed under two heads—mechanical injury, and excessive uterine contraction. Under the former are placed those uncommon cases in which the uterus lacerates as the result of some injury in the latter months of pregnancy, such as blows, falls, and the like. Not so rare, unfortunately, are lacerations produced by unskilled attempts at delivery on the part of the medical attendant, such as by the hand during turning, or by the blades of the forceps. Many such cases are on record, in which the accoucheur has used force and violence, rather than skill, in his attempts to overcome an obstacle. That such unhappy results of ignorance are not so uncommon as they ought to be is proved by the figures of Jolly, who has collected 71 cases of rupture during podalic version, 37 caused by the forceps, 10 by the cephalotribe, and 30 during other operations, the precise nature of which is not stated.² The *modus*

Mechanical injury as a cause of rupture.

¹ *Selected Obst. Works*, p. 385.

² *Op. cit.* p. 38.

Excessive
uterine ac-
tion.

operandi of protracted and ineffectual uterine contractions, as a proximate cause of rupture, is sufficiently evident, and need not be dwelt on. It is necessary to allude, however, to the effect of ergot, incautiously administered, as a producing cause. There is abundant evidence that the injudicious exhibition of this drug has often been followed by laceration of the unduly stimulated uterine fibres. Thus Trask, talking of the subject, says that Meigs had seen 3 cases, and Bedford 4, distinctly traceable to this cause. Jolly found that ergot had been administered largely in 33 cases in which rupture occurred.

Injudi-
cious ad-
ministra-
tion of er-
got.

Symptoms.

Some have believed that the impending occurrence of rupture could frequently be ascertained by peculiar premonitory symptoms, such as excessive and acute crampy pains about the lower part of the abdomen, due, no doubt, to the compression of part of the uterine walls. These are far too indefinite to be relied on, and it is certain that the rupture generally takes place without any symptoms that would have afforded reasonable grounds for suspicion.

General
symptoms.

The symptoms are often so distinct and alarming as to leave no doubt as to the nature of the case; not unfrequently, however, especially if the laceration be partial, they are by no means so well marked, and the practitioner may be uncertain as to what has taken place. In the former class of cases a sudden excruciating pain is experienced in the abdomen, generally during the uterine contractions, accompanied by a feeling, on the part of the patient, of something having given way. In some cases this has been accompanied by an audible sound, which has been noticed by the bystanders. At the same time there is generally a considerable escape of blood from the vagina, and a prominent symptom is the sudden cessation of the previously strong pains. Alarming general symptoms soon develop, partly due to shock, partly to loss of blood, both external and internal. The face exhibits the greatest suffering, the skin becomes deadly cold and covered with a clammy sweat, and fainting, collapse, rapid feeble pulse, hurried breathing, vomiting, and all the usual signs of extreme exhaustion quickly follow.

Results of
abdominal
and vagi-
nal exa-
minations.

Abdominal palpation and vaginal examination both afford characteristic indications in well marked cases. If the child, as often happens, have escaped entirely, or in great

part, into the abdominal cavity, it may be readily felt through the abdominal walls; while, in the former case, the partially contracted uterus may be found separate from it in the form of a globular tumour, resembling the uterus after delivery. Per vaginam it may generally be ascertained that the presenting part has suddenly receded, and can no longer be made out; or some other part of the fœtus may be found in its place. If the rupture be extensive, it may be appreciable on vaginal examination, and, sometimes, a loop of intestine may be found protruding through the tear. Other occasional symptoms have been recorded, such as an emphysematous state of the lower part of the abdomen, resulting from the entrance of air into the cellular tissue, or the formation of a sanguineous tumour in the hypogastrium, or vagina. These are too uncommon, and too vague, to be of much diagnostic value.

Unfortunately the symptoms are by no means always so distinct, and cases occur in which most of the reliable indications of rupture, such as the sudden cessation of the pains, the external hæmorrhage, and the retrocession of the presenting part may be absent. In some cases, indeed, the symptoms have been so obscure that the real nature of the case has only been detected after death.* It is rarely, however, that the occurrence of shock and prostration is not sufficiently distinct to arouse suspicion, even in the absence of the usual marked signs. In not a few cases distinct and regular contractions have gone on after laceration, and the child has even been born in the usual way. Of course, in such a case, mistake is very possible. So curious a circumstance is difficult of explanation. The most probable way of accounting for it is, that the laceration has not implicated the fundus of the uterus, which contracted sufficiently energetically to expel the fœtus. Hence it will be seen that the symptoms are occasionally obscure, and the practitioner must be careful not to overlook the occurrence of so serious an accident, because of the absence of the usual and characteristic symptoms.

Symptoms
are some-
times
obscure.

Uterine
contrac-
tions
sometimes
continue
after
rupture.

The prognosis is necessarily of the gravest possible character, but modern views as to treatment perhaps justify us in saying that it is not so absolutely hopeless as has been generally taught in our obstetric works. When we reflect

Prognosis.

To the
mother.

on what has occurred, the profound nervous shock; the profuse hæmorrhage, both external, and especially into the peritoneal cavity, where the blood coagulates and forms a foreign body; the passage of the uterine contents into the abdomen, with the inevitable result of inflammation and its consequences, if the patient survive the primary shock; the enormous fatality need cause no surprise. Jolly has found that out of 580 cases 100 recovered, that is in the proportion of 1 out of 6. This is a far more favourable result than we are generally led to anticipate; and as many of the recoveries happened in apparently the most desperate and unfavourable cases, we should learn the lesson that we need not abandon all hope, and should at least endeavour to rescue the patient from the terrible dangers to which she is exposed.

To the
child.

As regards the child the prognosis is almost necessarily fatal; and indeed, the cessation of the foetal heart-sounds has been pointed out by McClintock as a sign of rupture in doubtful cases. The shock, the profuse hæmorrhage, and the time that must necessarily elapse before the delivery of the child, are of themselves quite sufficient to explain the fact that the foetus is almost always dead.

Treat-
ment.

From what has been said of the impossibility of foretelling the occurrence of rupture, it must follow that no reliable prophylactic treatment can be adopted, beyond that which is a matter of general obstetric principle, viz. timely interference when the uterine contractions seem incapable of overcoming an obstacle to delivery, either on the part of the pelvis or foetus.

Indica-
tions after
rupture
has taken
place.

After rupture the main indications are to effect the removal of the child and the placenta, to rally the patient from the effects of the shock, and, if she survive so long, to combat the subsequent inflammation and its consequences. By far the most important point to decide is the best means to be adopted for the removal of the child; for it is admitted by all that the hopeless expectancy that was recommended by the older accoucheurs, or, in other words, allowing the patient to die without making any effort to save her, is quite inadmissible. If the foetus be entirely within the uterine cavity, no doubt the proper course to pursue is to deliver at once *per vias naturales*, either by turning, by forceps, or by cephalotripsy. If any part other than the head present,

Manage-
ment when
the foetus
remains
within the
uterus.

turning will be best, great care being taken to avoid further increase of the laceration. If the head be in the cavity or at the brim of the pelvis, and within easy reach of the forceps, they may be cautiously applied, the child being steadied by abdominal pressure, so as to facilitate their application. If there be, as is so often the case, some slight amount of pelvic contraction, it may be preferable to perforate and apply the cephalotribe, so as to avoid any forcible attempts at extraction, which might unduly exhaust the already prostrate patient, and turn the scale against her. This will be the more allowable since the child is, as we have seen, almost always dead, and we might readily ascertain if it be so by auscultation.

After delivery extreme care must be taken in removing the placenta, and for this it will be necessary to introduce the hand. Fortunately the placenta will generally be in the uterus, for if the rent be not large enough for the child to pass through, it may be inferred that the placenta will not have done so either. If, unfortunately, it has escaped from the uterus, very gentle traction on the cord may bring it within reach of the hand, and so the passage of the hand through the tear to search for it will be avoided.

Removal
of the
placenta.

There can be but little doubt that, in the cases indicated, such is the simplest treatment, and that which affords the mother the best chance. Unfortunately, the cases in which the child remains entirely in utero are comparatively uncommon, and generally it will have escaped into the abdomen, along with much extravasated blood. The usual plan of treatment recommended, under such circumstances, is to pass the hand through the fissure (some have even recommended that it should be enlarged by incision if necessary), to seize the feet of the foetus, to drag it back through the torn uterus, and then to re-introduce the hand to search for and remove the placenta. Imagine what occurs during the process. The hand gropes blindly among the abdominal viscera, the forcible dragging back of the foetus necessarily tears the uterus more and more, and, above all, the extravasated blood remains as a foreign body in the peritoneal cavity, and necessarily gives rise to the most serious consequences. It is surely hardly a matter of surprise that there is scarcely a single case on record of recovery after this procedure.

Treatment
when the
foetus has
escaped
out of the
uterus.

Reasons
why gas-
trotony
affords a
better
chance of
success.

Of late years a strong feeling has existed that, whenever the child has entirely, or in great part, escaped into the abdominal cavity, the operation of gastrotomy affords the mother a far better chance of recovery; and it has now been performed in many cases with the most encouraging results. It is easy to see why the prospects of success are greater. The uterus being already torn, and the peritoneum opened, the only additional danger is the incision of the abdominal parietes, which gives us the opportunity of sponging out the peritoneal cavity, as in ovariectomy, and of removing all the extravasated blood, the retention of which so seriously adds to the dangers of the case. Another advantage is that, if the patient be excessively prostrate, the operation may be delayed until she has somewhat rallied from the effects of the shock, whereas delivery by the feet is generally resorted to as soon as the rupture is recognised, and when the patient is in the worst possible condition for interference of any kind.

Comparative results
of various
methods of
treatment.

Jolly has carefully tabulated the results of these various methods of treatment, and, making every allowance for the unavoidable errors of statistics, it seems beyond all question that the results of gastrotomy are so greatly superior to those of other plans, that I think its adoption may fairly be laid down as a rule whenever the foetus is no longer within the uterine cavity.

COMPARATIVE RESULTS OF VARIOUS METHODS OF TREATMENT AFTER RUPTURE OF UTERUS.

	No. of Cases	Deaths	Recoveries	Per Cent. of Recoveries
Expectation	144	142	2	1.45
Extraction <i>per vias naturales</i>	382	310	72	19
Gastrotomy	38	12	26	68.4

Of course this table will not justify the conclusion that 68 per cent. of the cases of ruptured uterus in which gastrotomy is performed will recover; but it may fairly be taken as proving that the chances of recovery are at least three or four times as great as when the more usual practice is adopted.

Necessity
of care in
perform-
ing the
operation.

It is perhaps needless to say that the operation must be performed with the same minute care that has raised ovariotomy to its present pitch of perfection, and that especial

attention should be paid to the sponging out of the peritoneum, and the removal of foreign matters.

To recapitulate, I think, what has been said justifies the following rules of treatment after rupture:—

Recapitulation.

1. If the head or presenting part be above the brim, and the foetus still in utero—forceps, turning, or cephalotripsy, according to circumstances.

2. If the head be in the pelvic cavity—forceps or cephalotripsy.

3. If the foetus have wholly, or in great part, escaped into the abdominal cavity—gastrotomy.

As to the general treatment little need be said, since in this we must be guided by general principles. The chief indication will be to remove shock and rally the patient by stimulants, &c., and to combat secondary results by opiates and other appropriate remedies.

General treatment.

Lacerations of the vagina occasionally take place, and in the great majority of cases, they are produced by instruments, either from a want of care in their introduction, or from undue stretching of the vaginal walls during extraction with the forceps. Slight vaginal lacerations are probably much more common after forceps delivery than is generally believed to be the case. As a rule they are productive of no permanent injury, although it must not be forgotten that every breach of continuity increases the risk of subsequent septic absorption. When the laceration is sufficiently deep to tear through the recto-vaginal septum, or the anterior vaginal wall, the passage of the urine or feces is apt to prevent its edges uniting; then that most distressing condition, recto-vaginal, or vesico-vaginal fistula is established.

Lacerations of the vagina.

Slight vaginal lacerations are of frequent occurrence.

In the graver varieties recto-vaginal or vesico-vaginal fistulae may result.

It must not be supposed that fistulae are often the result of injury during operative interference. That is a common opinion both among the profession and the public, but a very erroneous one. In the vast majority of cases the fistulous opening is the consequence of a slough resulting from inflammation, produced by long-continued pressure of the vaginal walls between the child's head and the bony pelvis, in cases in which the second stage has been allowed to go on too long. In most of these cases instruments were doubtless eventually used, and they get the blame of the accident:

Such fistulae, however, are seldom caused by mechanical injury.

whereas the fault lay, not in their being employed, but rather in their not having been used soon enough to prevent the contusion and inflammation which ended in sloughing.

Proof of
this state-
ment.

When vesico-vaginal fistulæ are the result of lacerations during labour the urine must escape at once, but this is rarely the case. In the large majority of cases the urine does not pass per vaginam until more than a week after delivery, showing that a lapse of time is necessary for inflammatory action to lead to sloughing. In order to throw some light on these points, on which very erroneous views have been held, I have carefully examined the histories, from various sources, of 63 cases of vesico-vaginal fistula.

Statistical
facts.

1st. In 20 no instruments were employed. Of these, there were in labour under 24 hours . . .	2
from 24 to 48 hours , . .	8 ¹
„ 48 to 70 „ . . .	2
„ 70 to 80 „ . . .	7
„ 80 hours and upwards . . .	1
	<hr/>
	20

Therefore out of these 20 cases one-half were certainly more than 48 hours in labour, and 6 of the remaining 10 were probably so also. In only 1 of them is the urine stated to have escaped per vaginam immediately after delivery. In 7 it is said to have done so within a week, and in the remainder after the seventh day.

2nd. In 34 cases instruments were used, but there is no evidence of their having produced the accident. Of these, there were in labour under 24 hours . . .	2
from 24 to 48 „ . . .	8
„ 48 to 72 „ . . .	10
„ 72 hours and upwards . . .	14
	<hr/>
	34

The urine escaped within 24 hours in 2 cases only, within a week in 16, and after the seventh day in 15.

So that here again we have the history of unduly pro-

¹ But of these in seven no precise time is stated. Six of them are marked *very tedious*, therefore, they probably exceeded the limit.

tracted delivery, 24 out of the 34 having been certainly more than 48 hours in labour.

3rd. In 9 cases the histories show that the production of the fistula may fairly be ascribed to the unskilled use of instruments. Of these, there were in labour—

under 24 hours . . .	7
from 24 to 48 hours . .	1
„ 48 to 72 „ . .	1
	<hr/>
	9

The urine escaped at once in 7 cases, and in the remaining 2 after the seventh day.

These statistics seem to me to prove, in the clearest manner that, in the large majority of cases, this unhappy accident may be directly traced to the bad practice of allowing labour to drag on many hours in the second stage without assistance, and not to premature instrumental interference.

As to the treatment of vaginal laceration, little can be said. In the slighter cases vaginal injections of diluted Condyl's fluid will be useful to lessen the risk of septic absorption; and the graver, when vesico-vaginal or recto-vaginal fistulæ have actually formed, are no longer within the domain of the obstetrician, but must be treated surgically at some future date.

Treat-
ment.

CHAPTER XVII.

INVERSION OF THE UTERUS.

Its formidable character.

INVERSION of the uterus shortly after the birth of the child is one of the most formidable accidents of parturition, leading to symptoms of the greatest urgency, not rarely proving fatal, and requiring prompt and skilful treatment. Hence it has obtained an unusual amount of attention, and there are few obstetric subjects which have been more carefully studied.

An accident of great rarity.

Fortunately, the accident is one of great rarity. It was only observed once in upwards of 190,800 deliveries at the Rotunda Hospital since its foundation in 1745; and many practitioners have conducted large midwifery practices for a lifetime without ever having witnessed a case. It is none the less needful, however, that we should be thoroughly acquainted with its natural history, and with the best means of dealing with the emergency when it arises.

Division into acute and chronic forms.

Inversion of the uterus may be met with in both the acute and chronic form; that is to say, it may come under observation either immediately or shortly after its occurrence, or not until after a considerable lapse of time, when the involution following pregnancy has been completed. The latter falls more properly under the province of the gynæcologist, and involves the consideration of many points that would be out of place in a work on obstetrics. Here, therefore, the acute form of inversion alone is considered.

Description of inversion.

Inversion of the uterus consists essentially in the enlarged and empty uterus being turned inside out, either partially or entirely; and this may occur in various degrees, three of which are usually described, and are practically useful to bear in mind. In the first and slightest form we have merely a cup-shaped depression of the fundus (fig. 135);

in the second the depression is greater, so that the inverted portion forms an intro-susception, as it were, and projects downwards through the os

Fig. 133.



PARTIAL INVERSION OF THE FUNDUS.
(From a preparation in the museum of
Guy's Hospital.)

in the form of a round ball, not unlike the body of a polypus, for which, indeed, a careless observer might mistake it; and, thirdly, we have the complete variety, in which the whole organ is turned inside out as far as the cervix, and may even project beyond the vulva.

The symptoms of inversion are generally very characteristic, although, when the amount of inversion is small, they may entirely escape observation. They are chiefly those of profound nervous shock, fainting, small, rapid, and feeble pulse, possibly convulsions and vomiting,

Its symptoms.

and a cold, clammy skin. Occasionally severe abdominal pain, and a sensation of cramp and bearing down are observed. Haemorrhage is a frequent accompaniment, sometimes to a very alarming extent, especially if the placenta be partially or entirely detached. The loss of blood depends to a great extent on the condition of the uterine parietes. If there be much contraction of the part that is not inverted, the intro-suscepted part may be sufficiently compressed to prevent any great loss. If the entire organ be in a state of relaxation; the loss may be excessive.

The occurrence of such symptoms shortly after delivery would of necessity lead to an accurate examination, when the nature of the case may be at once ascertained. On passing the finger into the vagina, we either find the entire uterus forming a globular mass, to which the placenta is often attached; or, if the inversion be incomplete, the vagina is occupied by a firm, round, and tender swelling, which can be traced upwards through the os uteri. The left hand placed on the abdomen will detect the absence of the round ball of the contracted uterus, and bi-manual examination

Results of physical examination.

may even enable us to feel the cup-shaped depression at the site of inversion.

Differen-
tial diag-
nosis.

When such signs are observed immediately after delivery, mistake is hardly possible. Numerous instances, however, are recorded in which the existence of inversion was not immediately detected, and the tumour formed by it only observed after the lapse of several days, or even longer, when the general symptoms led to vaginal examination. It is probable that, in such cases, a partial inversion had taken place shortly after delivery, which, as time elapsed, became gradually converted into the more complete variety. In a case of this kind, as in a chronic inversion, some care is necessary to distinguish the inversion from a uterine polypus, which it closely resembles. The cautious insertion of the sound will render the diagnosis certain, since its passage is soon arrested in inversion, while, if the tumour be polypoid, it readily passes in as far as the fundus.

Manner in
which in-
version is
produced.

The mechanism by which inversion is produced is well worthy of study, and has given rise to much difference of opinion.

Occasion-
ally
produced
by acci-
dental
mechani-
cal causes.

A very general theory is, that it is caused, in many cases, by mismanagement of the third stage of labour, either by traction on the cord, the placenta being still adherent, or by improperly applied pressure on the fundus; the result of both these errors being a cup-shaped depression of the fundus, which is subsequently converted into a more complete variety of inversion. That such causes may suffice to start the inversion cannot be doubted, but it is probable that their frequency has been much exaggerated. Still there are numerous recorded cases in which the commencement of the inversion can be traced to them. Improperly applied pressure (as when the whole body of the uterus is not grasped in the hollow of the hand, but when a monthly nurse, or other uninstructed person, presses on the lower part of the abdomen, so as simply to push down the uterus *en masse*) is often mentioned in histories of the accident. Thus in the 'Edinburgh Medical Journal' for June, 1848, a case is related in which the patient would not have a medical man, but was attended by a midwife, who, after the birth of the child, pulled on the cord, while the patient herself clasped her hands and pushed down her abdomen, at the same time

straining forcibly, when the uterus became inverted, and the patient died of hæmorrhage before assistance could be procured. Here both the mechanical causes mentioned were in operation. In several cases it is mentioned that the accident occurred while the nurse was compressing the abdomen. That the accident is practically impossible when firm and equable contraction has taken place, can hardly be questioned. Hence it is of paramount importance that the practitioner should himself carefully attend to the conduct of the third stage of labour.

In a large proportion of cases no accidental mechanical causes can be traced, and the occurrence of spontaneous inversion must be admitted. There are various theories held as to how this occurs. Partial and irregular contraction of the uterus is generally admitted to be an important factor in its production: but it is still a matter of dispute whether the inversion is produced mainly by an active contraction of the fundus and body of the uterus, the lower portion and cervix being in a state of relaxation; or whether the precise reverse of this exists, the fundus being relaxed and in a state of quasi-paralysis, while the cervix and lower portion of the uterus are irregularly contracted. The former is the view maintained by Radford and Tyler Smith, while the latter is upheld by Matthews Duncan.

Often
occurs
spontaneously.

There are good clinical reasons for believing that Duncan's view more nearly corresponds with the true facts of the case; for, if the fundus be really in a state of active contraction, while the cervix is relaxed, we have, as Duncan points out, the very condition which is normal and desirable after delivery, and that which we do our best to produce. If, however, the opposite condition exist, and the fundus be relaxed, while the lower portion is spasmodically contracted, a state exists closely allied to the so-called hour-glass contraction. Supposing now any cause produces a partial depression of the fundus, it is easy to understand how it may be grasped by the contracted portion, and carried more and more down, in the manner of an intro-susception, until complete inversion results. That such partial paralysis often exists, especially about the placental site, was long ago pointed out by Rokitansky, and other pathologists. This theory supposes the original partial depression of the fundus. How this is often

Evidence
in favour
of Duncan's
theory.

produced by mismanagement of the third stage has already been pointed out; but, even in the absence of such causes, it may result from strong bearing down efforts on the part of the patient, or, as Duncan holds, from the absence of the retentive power of the abdomen. Indeed, the incompatibility of an actively contracted state of the fundus with the partial depression which is essential, according to both views, for the production of inversion, is the strongest argument in favour of Duncan's theory.

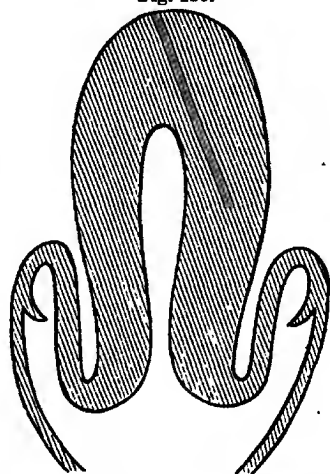
Taylor's
theory.

A totally different view has more recently been sustained by Dr. Taylor, of New York, who maintains that 'spontaneous active inversion of the uterus rests upon prolonged natural and energetic action of the body and fundus; the cervix, the lower part, yielding first, is thus rolled out, or everted, or doubled up, as there is no obstruction from the contractility of the cervix, which is at rest or functionally paralysed; the body is gradually, sometimes instantaneously, forced lower and lower, or inverted.'¹ That partial inversion may commence at the cervix was pointed out by Duncan in his paper, who depicts it in the accompanying diagram (fig. 135), and states it to be of not unfrequent occurrence. It is not impossible that occasionally such a state of things should be carried on to complete inversion. But there are serious objections to the acceptance of Dr. Taylor's view that such is the principal cause of inversion, since the process above described would be of necessity a slow and long-continued one, whereas nothing is more certain than that inversion is generally sudden and accompanied by acute symptoms of shock, and is often attended by severe hæmorrhage, which could not occur when such excessive contraction was taking place.

Treat-
ment.

The treatment of inversion consists essentially in restoring the organ to its natural position as soon as possible. Every

Fig. 136.



ILLUSTRATING THE COMMENCEMENT OF
INVERSION AT THE CERVIX.

¹ *New York Med. Jour.* 1872.

moment's delay only serves to render this more difficult, the inverted portion becoming swollen and strangulated; whereas if the attempt at reposition be made immediately, there is generally comparatively little difficulty in effecting it. Therefore it is of the utmost importance that no time should be lost, and that we should not overlook a partial or incomplete inversion. Hence the occurrence of any unusual shock, pain, or hæmorrhage after delivery, without any readily ascertained cause, should always lead to a careful vaginal examination. A want of attention to this rule has too often resulted in the existence of partial inversion being overlooked, until its reduction was found to be difficult or impossible.

Importance of not overlooking partial inversion.

In attempting to reduce a recent inversion, the whole uterus should be grasped in the hollow of the hand and pushed gently and firmly upwards into its former position, great care being taken to apply the pressure in the proper axis of the pelvis, and to use counter pressure, by the left hand, on the abdominal walls. Barnes lays stress on the importance of directing the pressure towards one side, so as to avoid the promontory of the sacrum. The common plan of endeavouring to push back the fundus first has been well shown by McClintock¹ to have the disadvantage of increasing the bulk of the mass that has to be reduced, and he advises that, while the fundus is lessened in size by compression, we should, at the same time, endeavour to push up first the part that was last inverted, that is to say, the portion nearest the os uteri. Should this be found impossible, some assistance may be derived from the manœuvre, recommended by Merriman and others, of first endeavouring to push up one side or wall of the uterus, and then the other, alternating the upward pressure from one side to the other as we advance. It often happens as the hand is thus applied, that the uterus somewhat suddenly reinverts itself, sometimes with an audible noise, much as an india-rubber bottle would do under similar circumstances. When reposition has taken place the hand should be kept for some time in the uterine cavity to excite tonic contraction; or Barnes' suggestion of injecting a weak solution of perchloride of iron may be adopted, so as to constrict the uterine walls, and prevent a recurrence of the accident.

Mode of attempting reduction.

¹ *Diseases of Women*, p. 70.

It is hardly necessary to point out how much these manœuvres will be facilitated by placing the patient fully under the influence of an anæsthetic.

Manage-
ment
of the
placenta.

There has been much difference of opinion as to the management of the placenta in cases in which it is still attached when inversion occurs. Should we remove it before attempting reposition, or should we first endeavour to reinvert the organ, and subsequently remove the placenta? The removal of the placenta certainly much diminishes the bulk of the inverted portion, and, therefore, renders reposition easier. On the other hand, if there be much hæmorrhage, as is so frequently the case, the removal of the placenta may materially increase the loss. For this reason, most authorities recommend that an endeavour should be made at reduction before peeling off the after-birth. But if any delay or difficulty be experienced from the increased bulk, no time should be lost, and it is in every way better to remove the placenta and endeavour to replace the organ as soon as possible.

Manage-
ment of
cases de-
tected
some time
after
delivery.

Supposing we meet with a case in which the existence of inversion has been overlooked for days, or even for a week or two, the same procedure must be adopted; but the difficulties are much greater, and the longer the delay, the greater they are likely to be. Even now, however, a well-conducted attempt at taxis is likely to succeed. Should it fail, we must endeavour to overcome the difficulty by continuous fluid pressure applied by means of caoutchouc bags, distended with water, and left in the vagina. It is rarely that this will fail in a comparatively recent case, and such only are now under consideration. It is likely that by fluid pressure, applied in this way for twenty-four or forty-eight hours, and then followed by taxis, any case detected before the involution of the uterus is completed may be successfully treated.

PART IV.

OBSTETRIC OPERATIONS.

CHAPTER I. .

INDUCTION OF PREMATURE LABOUR.

THE first of the obstetric operations we have to consider is the *induction of premature labour*, an operation which, like the forceps, was first suggested and used in this country, and the recognition of which, as a legitimate procedure, we also chiefly owe to the labour of our fellow countrymen, in spite of much opposition both at home and abroad. It is not known with certainty to whom we owe the original suggestion; but we are told by Denman that in the year 1756 there was a consultation of the most eminent physicians at that time in London, to consider the advantages which might be expected from the operation. The proposal met with formal approval, and was shortly after carried into practice by Dr. Macaulay, the patient being the wife of a linendraper in the Strand. From that time it has flourished in Great Britain, the sphere of its application has been largely increased, and we have the satisfaction of knowing that it has been the means of saving many mothers and children, who would otherwise, in all probability, have perished. On the Continent it was long before the operation was sanctioned or practised. Although recommended by some of the most eminent German practitioners, it was not actually performed until the year 1804. In France the opposition was long continued and bitter. Many of the leading teachers strongly denounced it, and the Academy of Medicine formally discountenanced it so late as the year 1827. The objections were chiefly based on religious grounds, but partly, no

History of
the operation.

doubt, on mistaken notions as to the object proposed to be gained. Although frequently discussed, the operation was never actually carried into practice until the year 1831, when Stoltz performed it with success. Since that time opposition has greatly ceased, and it is now employed and highly recommended by the most distinguished obstetricians of the French schools:

Objects of the operation.

It may be performed either on account of the mother or child alone, or of both.

Defective proportion between the child and pelvis is the most frequent indication.

In inducing premature labour, we propose to avoid or lessen the risk to which, in certain cases, the mother is exposed by delivery at term, or to save the life of the child which might otherwise be endangered. Hence the operation may be indicated either on account of the mother alone, or of the child alone, or, as not unfrequently happens, of both together.

In by far the largest number of cases the operation is performed on account of defective proportion between the child and the maternal passages, due to some abnormal condition on the part of the mother. This want of proportion may depend on the presence of tumours either of the uterus or growing from the pelvis. But most frequently it arises from deformity of the pelvis (p. 75), and it is needless to repeat what has been said on that point. I shall, therefore, only briefly refer to a few more uncommon causes, which occasionally necessitate its performance.

Habitually large size of the foetal head.

One of these is an habitually large, or over-firmly ossified, foetal head. Should we meet with a case in which the labours are always extremely difficult, and the head apparently of unusual size, although there be no apparent want of space in the pelvis, the induction of labour would be perfectly justifiable, and in all probability would accomplish the desired object. In such cases the proper period of delivery would require to be anticipated by a very short time. A week or a fortnight might make all the difference between a labour of extreme severity, and one of comparative ease.

Condition of the mother's health calling for the operation.

There is a large class of cases in which the condition of the mother indicates the operation. Many of these have already been considered when treating of the diseases of pregnancy. Amongst them may be mentioned uncontrollable vomiting, which has resisted all treatment, and which has produced a state of exhaustion threatening to prove fatal: chorea, albuminuria, convulsions, or mania may also be

aggravated or originated by pregnancy; excessive anasarca, ascites, or dyspnea, connected with disease of the heart, lungs or liver, may be, in a great measure, caused by the pressure of the enlarged uterus; in fact, any condition or disease affecting the mother, provided only we are convinced that the termination of pregnancy would give the patient relief, and that its continuance would involve serious danger. It need hardly be pointed out that the induction of labour for any such causes involves grave responsibility, and is decidedly open to abuse; no practitioner would, therefore, be justified in resorting to it, especially if the child have not reached a viable age, without the most anxious consideration. No general rules can be laid down. Each case must be treated on its own merits. It is obvious that the nearer the patient is to the full period, the greater will be the chance of the child surviving, and the less hesitation need then be felt about consulting the interests of the mother.

In another class of cases the operation is indicated by circumstances affecting the life of the child alone. Of these the most common are those in which the child dies, in several successive pregnancies, before the termination of utero-gestation. This is generally the result of fatty, calcareous, or syphilitic degeneration of the placenta, which is thus rendered incapable of performing its functions. These changes in the placenta seldom commence until a comparatively advanced period of pregnancy; so that if labour be somewhat hastened, we may hope to enable the patient to give birth to a living and healthy child. The previous experience of the mother will indicate the period at which the death of the foetus has formerly taken place, as she would then have appreciated a difference in her sensations, a diminution in the vigour of the foetal movements, a sense of weight and coldness, and similar signs. For some weeks before the time at which this change has formerly been experienced, we should carefully auscultate the foetal heart from day to day, and, in most cases, the approach of danger will be indicated sufficiently soon to enable us to interfere with success, by tumultuous and irregular pulsations, or a failure in their strength and frequency. On the detection of these, or on the mother feeling that the movements of the child are becoming less strong, the operation should at once be per-

Conditions
affecting
the safety
of the
child
alone.

formed. Simpson also induced premature labour with success in a patient who twice gave birth to hydrocephalic children. In the third pregnancy, which he terminated before the natural period, the child was well formed and healthy.

Induction
of labour
when the
mother is
mortally
ill.

Some obstetricians have proposed to induce labour, with the view of saving the child, when the mother was suffering from mortal disease. This indication is, however, so extremely doubtful from a moral point of view, that it can hardly be considered as ever justifiable.

Various
methods of
inducting
labour;
their mode
of action.

The means adopted for the induction of labour are very numerous. Some of them act through the maternal circulation, as the administration of ergot, and other oxytoxics; others by their power of exciting reflex action, or by interfering with the integrity of the ovum, or by a combination of both, as the vaginal douche, the separation of the membranes from the uterine walls, the puncture of the ovum, dilatation of the os, stimulating enemata, or irritation of the breasts. The former class are never employed in modern obstetric practice. Of the latter, some offer special advantages in particular cases, but none are equally adapted for all emergencies. Often a combination of more methods than one will be found most useful. I shall mention the various methods in use, and discuss briefly the relative advantages and disadvantages of each.

Puncture
of mem-
branes.

The evacuation of the liquor amnii, by the puncture of the membranes, was the first method practised, and was that recommended by Denman and all the earlier writers. It is the most certain which can be employed, as it never fails, sooner or later, to induce uterine contractions. There are, however, several disadvantages connected with it, which are sufficient to contra-indicate its use in the majority of cases. It is uncertain as regards the time taken in producing the desired effect, pains sometimes coming on within a few hours, but occasionally not until several days have elapsed. The contracting walls of the uterus will press directly on the body of the child, which, being frail and immature, is less able to bear the pressure than at the full period of pregnancy. Hence it involves great risk to the fœtus. Besides, the escape of the water does away with the fluid wedge so useful in dilating the os, and should version be necessary from mal-presentation—a complication more likely to occur than

in natural labour—the operation would have to be performed under very unfavourable conditions. These objections are sufficient to justify the ordinary opinion that this procedure should not be adopted, unless other means have been first tried and failed. Every now and then cases are met with in which it is extremely difficult to arouse the uterus to action, and, under such circumstances, in spite of its drawbacks, this method will be found to be very valuable. When the operation has to be performed before the child is viable, that is before the seventh month, these objections do not hold, and then it is the simplest and readiest procedure we can adopt. Indeed, in producing early abortion no other is practicable. The operation itself is most simple, requiring only a quill, stilletted catheter, or other suitable instrument, to be passed up to the os, carefully guarded by the fingers of the left hand previously introduced, and to be pressed against the membranes until perforation is accomplished. Meissner, of Leipsic, has proposed, as a modification of this plan, that the membranes should be punctured obliquely, three or four inches above the os, so as to admit of a gradual and partial escape of the amniotic fluid, thus lessening the risk to the child from pressure by the uterus. For this purpose he employed a curved* silver canula, containing a small trocar, which can be projected after introduction. The risk of injuring the uterus by such an instrument would be considerable, and we have other and better means at our command which render it unnecessary. When we require to produce early abortion, it would be well not to attempt to puncture the membranes with a sharp pointed instrument. The*object can be effected with equal certainty, and greater safety, by passing an ordinary uterine sound through the os, and turning it round once or twice.

The administration of ergot of rye, either alone, or combined with borax and cinnamon, has been sometimes resorted to. This practice has been principally advocated by Rambotham, who was in the habit of exhibiting scruple doses of the powdered ergot every fourth hour, until delivery took place. Sometimes he found that as many as thirty or forty doses were required to effect the object; occasionally labour commenced after a single dose. Finding that the infantile

Adminis-
tration of
oxytocics.

mortality was very great when this method was followed, he modified it, and administered two or three doses only, and, if these proved insufficient, he punctured the membranes. There can be no doubt that ergot possesses the power of inducing uterine contractions. The risk to the child is, however, quite as great as when the membranes are punctured; for not only is it subject to injurious pressure from the tumultuous and irregular contractions which the ergot produces, but the drug itself, when given in large doses, seems to exert a poisonous influence on the foetus. For these reasons ergot may properly be excluded from the available means of inducing labour.

Methods
acting in-
directly on
the uterus.

Various methods have been recommended which act indirectly on the uterus, the source of irritation being at a distance. Thus D'Outrepoint used frequently repeated abdominal frictions and tight bandages. Scanzoni, remembering the intimate connection between the mammæ and uterus, and the tendency which irritation of the former has to induce contraction of the latter, recommended the frequent application of cupping-glasses to the breasts. Radford and others have employed galvanism. Stimulating enemata have been employed. All these methods have occasionally proved successful, and, unlike the former plans we have mentioned, they are not attended by any special risk to the child. They are, however, much too uncertain to be relied on, besides being irksome both to the patient and practitioner.

The artificial dilation of the os uteri in imitation of its natural opening in labour, was first practised by Klüge. He was in the habit of passing within the os a tent made of compressed sponge, and allowing it to dilate by imbibition of fluid. If labour were not provoked within twenty-four hours he removed it, and introduced a fresh one of larger dimensions, changing it as often as was necessary until his object was accomplished. Although this operation seldom failed to induce labour, it had the disadvantage of occupying an indefinite time, and the irritation produced was often painful and annoying. Dr. Keiller, of Edinburgh, was the first to suggest the use of caoutchouc bags, distended by air, as a means of dilating the os. This plan has been perfected by Dr. Barnes in his well-known dilators, which

are of great use in many cases in which artificial dilatation of the cervix is necessary. They consist of a series of india-rubber bags of various sizes, with a tube attached (fig. 137), through which water can be injected by an ordinary Higginson's syringe. They have a small pouch fixed externally, in which a sound can be placed, so as to facilitate their introduction. When distended with water the bags assume somewhat of a fiddle shape, bulging at both extremities, which insures their being retained within the os. When first introduced into practice as a means of inducing labour, it was thought that this method gave a complete control over the process, so that it could be concluded within a definite time at the will of the operator. The experience of those

Fig. 187.

BARNES' BAG FOR
DILATING THE CERVIX.

who have used it much has certainly not justified this anticipation. It is true that, occasionally, contractions supervene within a few hours after dilatation has been commenced; but, on the other hand, the uterus often responds very imperfectly to this kind of stimulus, and the bags may be inserted for many consecutive hours without the desired result supervening; the puncture of the membranes being eventually necessary in order to hasten the process. Indeed, my own experience would lead me to the conclusion that, as a means of evoking uterine contraction, cervical dilatation is very unsatisfactory. Dr. Barnes himself has evidently seen reason to modify his original views, for, while he at first talked of the bags as enabling us to induce labour with certainty at a given time, he has since recommended that uterine action should be first provoked by other means, the dilators being subsequently used to accelerate the labour thus brought on. The bags thus employed find, as I believe, their most useful and a very valuable application; but when used in this way they cannot be considered a means of originating uterine action. A subsidiary objection to the bags is the risk of displacing the presenting part. I have, for example, introduced them when the head was presenting, and, on their removal, found the shoulder lying over the os. It is not difficult to understand how the continuous pressure of a distended bag in the internal os

might easily push away the head, which is so readily moveable as long as the membranes are unruptured. Still, if labour be in progress, and the os insufficiently dilated, the possibility of this occurrence is not a sufficient reason for not availing ourselves of the undoubtedly valuable assistance which the dilators are capable of giving.

Separation
of the
mem-
branes.

Some processes for inducing labour act directly on the ovum, by separating the membranes, to a greater or less extent, from the uterine walls. The first procedure of the kind was recommended by Dr. Hamilton, of Edinburgh, and consisted in the gradual separation of the membranes for one or two inches all round the lower segment of the uterus. To reach them the finger had to be gently insinuated into the interior of the os, which was gradually dilated to a sufficient extent by a series of successive operations, repeated at intervals of three or four hours. When this had been accomplished, the fore finger was inserted and swept round between the membranes and the uterus, but it was frequently found necessary to introduce the greater part of the hand to effect the object, and, sometimes, even this was not sufficient, and a female catheter or other instrument had to be used for the purpose. The method was generally successful in bringing on labour, but it now and then failed, even in Dr. Hamilton's hands. It is certainly based on correct principles, but it is tedious and painful both to the practitioner and patient, and very uncertain in its time of action. For these reasons it has never been much practised.

Vaginal
and
uterine
douches.

In the year 1836 Kiwisch suggested a plan, which, from its simplicity, has met with much approval. It consists in projecting, at intervals, a stream of warm or cold water against the os uteri. Its action is doubtless complex. Kiwisch himself believed that relaxation of the soft parts, through the imbibition of water, was the determining cause of labour. Simpson found that the method failed, unless the water mechanically separated the membranes from the uterine walls. Besides this effect, it probably directly induces reflex action, by distending the vagina and dilating the os. In using it, it has been customary to administer a douche twice daily, and more frequently if rapid effects be desired. The number required varies in different cases. The largest number Kiwisch found it necessary to use was 17, the smallest 4. The

average time that elapses before labour sets in is four days. Hence the method is obviously useless when rapid delivery is required.

Dr. Cohen, of Hamburg, introduced an important modification of the process, which has been considerably practised. It consists in passing a silver or gum-elastic catheter some inches within the os, between the membranes and the uterine walls, and injecting the fluid through it directly into the cavity of the uterus. He used creosote, or tar-water, and injected, without stopping, until the patient complained of a feeling of distension. Others have found the plan equally efficacious when they only employed a small quantity of plain water, such as 7 or 8 ounces. Professor Lazarewitch, of Charkoff, is a strong advocate of this method. He believes that uterine action is evoked much more rapidly and certainly if the water be injected near the fundus, and he has contrived an instrument for the purpose, with a long metallic nozzle.

So many fatal cases have followed these methods, that it cannot be doubted that, in spite of their certainty and simplicity, there is an element of risk in them which should not be overlooked. Many of these are recorded in Barnes' work, and he comes to the conclusion, which the facts unquestionably justify, that 'the douche, whether vaginal or intra-uterine, ought to be absolutely condemned as a means of inducing labour.' The precise reason of the danger is not very obvious. Sudden stretching of the uterine walls, producing shock, has been supposed to have caused it; but in many of the fatal cases the symptoms have been rather those attending the passage of air into the veins, and it is easy to understand how air may have been introduced, in this way, into the large uterine sinuses.

Simpson and Scanzoni have both tried with success the injection of carbonic acid gas into the vagina. Fatal results have, however, followed its employment, and Simpson has expressed an opinion that the experiment should not be repeated.

Simpson originally induced labour by passing the uterine sound within the os, and up towards the fundus, and, when it had been inserted to a sufficient extent, moving it slightly from side to side. He was led to adopt this procedure in

Dangers of these plans.

Injection of carbonic acid gas.

Simpson's method of operating.

Introduc-
tion of a
flexible
catheter or
bougie.

the belief that we might thus closely imitate the separation of the decidua, which occurs previous to labour at term. Uterine contractions were induced with certainty and ease, but it was found impossible to foretell what time might elapse between the commencement of labour and the operation, which had frequently to be performed more than once. He subsequently modified this procedure by introducing a flexible male catheter, without a stilette, which he allowed to remain in the uterus until contractions were excited. This plan is much used in Germany, and is now that which is also most frequently adopted in this country. It is simple and very efficacious, pains coming on, almost invariably, within twenty-four hours after the catheter or bougie is introduced. A theoretical objection is the possibility of the catheter separating a portion of the placenta and giving rise to hæmorrhage; but in practice this has not been found to occur, and the risk might generally be avoided by introducing the catheter at a distance from the placenta, the probable situation of which has been ascertained by auscultation. The more deeply the catheter is introduced, the more certain and rapid is its effect, and not less than ~~seven~~ inches should be pushed up within the os. It is not always easy to insert it so far, especially if a flexible catheter be used, which is apt to be too pliable to pass upwards with ease. A solid bougie—male urethral bougie—should, therefore, be employed, and I have found its introduction greatly facilitated by anæsthetising the patient, and passing the greater part of the hand into the vagina. In this way it can be pushed in very gently, and without any risk of injury to the uterus. There is some chance of rupturing the membranes while pushing it upwards. This accident, indeed, cannot always be avoided, even when the greatest care is taken; but, when it occurs, the puncture will be at a distance from the os, so that a small portion only of the liquor amnii will escape, and this can scarcely be considered a serious objection. It is always an advantage to allow the pains to come on gradually, and in imitation of natural labour. Therefore, if, after the bougie has been inserted for a sufficient time, uterine contractions come on sufficiently strongly, we may then leave the case to be terminated naturally; or, if they be comparatively feeble, we may resort to the accelerative procedures recommended by

Barnes, the dilatation of the cervix by the fluid bags, and subsequently the puncture of the membranes. In this way we have the labour completely under control; and I believe this method will commend itself to those who have experience of it, as the simplest and most certain mode of inducing labour yet known, and the one most closely imitating the natural process.

It should not be forgotten that the child is immature, and that unusual care is likely to be required to rear it successfully. We should, therefore, be careful to have at hand all the usual means of resuscitation; and, as the mother may not be able to nurse at once, it would be a good precaution to have a healthy wet nurse in readiness.

The child is immature and difficult to rear.

CHAPTER II

TURNING.

History
of the
operation.

TURNING, by which we mean the alteration of the position of the foetus, and the substitution of some other portion of the body for that originally presenting, is one of the most important of obstetric operations, and merits careful study. It is also one of the most ancient, and was evidently known to the Greek and Roman physicians. Up to the fifteenth century, cephalic version—that in which the head of the foetus is brought over the os uteri—was almost exclusively practised, when Paré and his pupil Guillemeau taught the propriety of bringing the feet down first. It was by the latter physician especially that the steps of the operation were clearly defined; and the French have undoubtedly the merit both of perfecting its performance, and of establishing the indications which should lead to its use. Indeed, it was then much more frequently performed than in later times, since no other means of effecting artificial delivery were known, which did not involve the death of the child; and practitioners, doubtless, acquired great skill in its performance, and were inclined to overrate its importance, and extend its use to unsuitable cases. An opposite error was fallen into after the invention of the forceps, which for a time led to the abandonment of turning in certain conditions for which it was well adapted, and in which it has only of late years been again practised.

Cephalic
version.

Cephalic version has, since Paré wrote, been recommended and practised from time to time, but the difficulty of performing it satisfactorily was so great that it never became an established operation. Dr. Braxton Hicks has perfected a method by which it can be accomplished with greater ease and certainty, and which renders it a legitimate and satisfactory resort in suitable cases. To him we are also indebted for introducing a method of turning without

passing the entire hand into the cavity of the uterus, which, under favourable circumstances, is not only easy of performance, but deprives the operation of one of its greatest dangers.

The possibility of effecting version by external manipulation has been long known, and was distinctly referred to and recommended by Dr. John Pechey,¹ so far back as the year 1698. Since that time it has been strongly advocated by Wigand and his followers; and various authors in this country, notably Sir James Simpson, have referred to the advantage to be derived from external manipulation assisting the hand in the interior of the uterus. To Dr. Hicks, however, incontestably belongs the merit of having been the first distinctly to show the possibility of effecting complete version by combined external and internal manipulation, of laying down definite rules for its practice, and of thus popularising one of the greatest improvements in modern midwifery.

Turning by
external
and in-
ternal
manipula-
tion.

The operation is entirely dependent for success on the fact that the child in utero is freely moveable, and that its position may be artificially altered with facility. As long as the membranes are unruptured, and the foetus is floating in the surrounding fluid medium, it is liable to constant changes in position, as may be readily demonstrated in the latter months of pregnancy; and the operation, under these circumstances, may be performed with the greatest facility. Shortly after the liquor amnii has escaped there is still, as a rule, no great difficulty in effecting version; but, as the body is no longer floating in the surrounding liquid, its rotation must necessarily be attended with some increased risk of injury to the uterus. If the liquor amnii have been long evacuated, and the muscular structure of the uterus be strongly contracted, the foetus may be so firmly fixed, that any attempt to move it is surrounded with the greatest difficulties, and may even fail entirely, or be attended with such risks to the maternal structures as to be quite unjustifiable.

Object and
nature of
the opera-
tion.

Version may be required either on account of the mother or child alone; or it may be indicated by some condition imperilling both, and rendering immediate delivery necessary. The chief cases in which it is resorted to are those of trans-

Cases
suitable
for the
operation.

¹ *The Complete Midwife's Practice*, p. 142.

verse presentations, where it is absolutely essential; accidental or unavoidable hæmorrhage; certain cases of contracted pelvis; and some complications, especially prolapse of the funis. The special indications for the operation have been separately discussed under these subjects.

Statistics
and dan-
gers of the
operation.

The ordinary statistical tables cannot be depended on as giving any reliable results as to the risks of the operation. Taking all cases together, Dr. Churchill estimates the maternal mortality as 1 in 16, and the infantile as 1 in 3. Like all similar statistics, they are open to the objection of not distinguishing between the results of the operation itself, and of the cause which necessitated interference. Still they are sufficient to show that the operation is not free from grave hazards, and that it must not be undertaken without due reflection. The principal dangers will be discussed as we proceed. It may suffice to mention here that those to the mother must vary with the period at which the operation is undertaken. If version be performed early, before the rupture of the membranes, or, in favourable cases, without the introduction of the hand into the interior of the uterus, the risk must of course be infinitely less than in those more formidable cases in which the waters have long escaped, and the hand and arm have to be passed into an irritable and contracted uterus. But even in the most unfavourable cases accidents may be avoided, if the operator bear constantly in mind that the principal danger consists in laceration of the uterus or vagina from undue force being employed, or from the hand and arm not being introduced in the axis of the passages. There is no operation in which gentleness, absence of all hurry, and complete presence of mind are so essential. A certain number of cases end fatally from shock or exhaustion, or from subsequent complications. As regards the child, the mortality is little, if at all, greater than in original breech and footling presentations. Nor is there any good reason why it should be so, seeing that cases of turning, after the feet are brought through the os, are virtually reduced to those of feet presentation, and that the mere version, if effected sufficiently soon, is not likely to add materially to the risk to which the child is exposed.

The possibility of effecting *version by external manipulation* has been recognised by various authors, and was

made the subject of an excellent thesis by Wigand, who clearly described the manner of performing the operation. In spite of the manifest advantages of the procedure, and the extreme facility with which it can be accomplished in suitable cases, it has by no means become the established custom to trust to it, and probably most practitioners have never attempted it, even under the most favourable conditions. The possibility of operation is based on the extreme mobility of the foetus before the membranes are ruptured. After the waters have escaped, the uterine walls embrace the foetus more or less closely, and version can no longer be readily performed in this manner.

Version by
external
manipulation.

It may, therefore, be laid down as a rule that it should only be attempted when the abnormal position of the foetus is detected before labour has commenced, or in the early stage of labour, when the membranes are unruptured. It is also unsuitable for any but transverse presentations, for it is not meant to effect complete evolution of the foetus, but only to substitute the head for the upper extremity. It is useless whenever rapid delivery is indicated, for, after the head is brought over the brim, the conclusion of the case must be left to the natural powers.

Cases suitable for the operation.

The manner of detecting the presentation by palpation has been already described (vol. i. p. 116), and the success of the operation depends on our being able to ascertain the positions of the head and breech through the uterine walls. Should labour have commenced, and the os be dilated, the transverse presentation may be also made out by vaginal examination. Should the abnormal presentation be detected before labour has actually begun, it is, in most cases, easy enough to alter it, and to bring the foetus into the longitudinal axis of the uterine cavity. It is seldom, however, discovered until labour has begun, and even if it be altered, the child is extremely apt to reassume, in a short time, the faulty position in which it was formerly lying. Still there can be no harm in making the attempt, since the operation itself is in no way painful, and is absolutely without risk either to the mother or child. When the transverse presentation is detected early in labour, I believe it is good practice to endeavour to remedy it by external manipulation, and, if it fail, we may at once proceed to other

Method of performance.

and more certain methods of operating. The procedure itself is abundantly simple. The patient is placed on her back, and the position of the foetus ascertained by palpation, as accurately as possible, in the manner already indicated. The palms of the hands being then placed over the opposite poles of the foetus, by a series of gentle gliding inmovements, the head is pushed towards the pelvic brim, while the breech is moved in the opposite direction. The facility with which the foetus may sometimes be moved in this way can hardly be appreciated by those who have never attempted the operation. As soon as the change is effected, the long diameters of the foetus and of the uterus will correspond, and vaginal examination will show that the shoulder is no longer presenting, and that the head is over the pelvic brim. If the os be sufficiently dilated, and labour in progress, the membranes should now be punctured, and the position of the foetus maintained for a short time by external pressure, until we are certain that the cephalic presentation is permanently established. If labour be not in progress, an attempt may at least be made to effect the same object by pads and a binder; one pad being placed on the side of the uterus in the situation of the breech, and another on the opposite side in the situation of the head.

Cephalic
Version.

On account of the difficulty of performing *cephalic version* in the manner usually recommended, it has practically scarcely been attempted, and, with the exception of some more recent authors, it is generally condemned by writers on systematic midwifery. Still the operation offers unquestionable advantages in those transverse presentations in which rapid delivery is not necessary, and in which the only object of interference is the rectification of malposition; for, if successful, the child is spared the risk of being drawn footling through the pelvis. The objections to cephalic version are based entirely on the difficulty of performance; and, undoubtedly, to introduce the hand within the uterus, search for, seize, and afterwards place the slippery head in the brim of the pelvis, could not be an easy process, even under the most favourable circumstances, and must always be attended by considerable risk to the mother. Velpeau, who strongly advocated the operation, was of opinion that it might be more easily accomplished by pushing up the presenting part, than

by seizing and bringing down the head. Wigand more distinctly pointed out that the head could be brought to a proper position by external manipulation, aided by the fingers of one hand within the vagina. Dr. Hicks has laid down clear rules for its performance, which render cephalic version easy to accomplish under favourable conditions, and will doubtless cause it to become a recognised mode of treating malpositions. The number of cases, however, in which it can be performed must always be limited, since, as in turning by external manipulation alone, it is necessary that the liquor amnii should be still retained, or at least have only recently escaped; that the presentation be freely moveable above the pelvic brim; and that there be no necessity for rapid delivery. Dr. Hicks does not believe protrusion of the arm to be a contra-indication, and advises that it should be carefully replaced within the uterus. When, however, protrusion of the arm has occurred, the thorax is so constantly pushed down into the pelvis that replacement can neither be safe nor practicable, except under unusually favourable conditions, and podalic version will be necessary.

is applicable to a limited class of cases only.

It is impossible to describe the method of performing cephalic version more concisely and clearly than in Dr. Hicks' own words. 'Introduce,' he says, 'the left hand into the vagina, as in podalic version; place the right hand on the outside of the abdomen, in order to make out the position of the fœtus, and the direction of its head and feet. Should the shoulder, for instance, present, then push it with one or two fingers in the direction of the feet. At the same time pressure with the other hand should be exerted on the cephalic end of the child. This will bring the head down to the os; then let the head be received on the tips of the inside fingers. The head will play like a ball between the two hands; it will be under their command, and can be placed in almost any part at will. Let the head then be placed over the os, taking care to rectify any tendency to face presentation. It is as well, if the breech will not rise to the fundus readily after the head is fairly in the os, to withdraw the hand from the vagina, and with it press up the breech from the exterior. The hand which is retaining gently the head from the outside should continue there for some little time, till the pains have ensured the retention of the child

Method of performance.

in its new position and the adaptation of the uterine walls to its new form. Should the membranes be perfect, it is advisable to rupture them as soon as the head is at the os uteri; during their flow and after the head will move easily into its proper position.'

The procedure thus described is so simple, and would occupy so short a time, that there can be no objection to trying it. Should we fail in our endeavours, we shall not be in a worse position for effecting delivery by podalic version, which can be proceeded with without withdrawing the hand from the vagina, or in any way altering the position of the patient.

Podalic
version.

The method of performing *podalic version* varies with the nature of each particular case. In describing the operation, it has been usual to divide the cases into those in which the circumstances are favourable, and the necessary manœuvres easily accomplished; and those in which there are likely to be considerable difficulties, and increased risk to the mother. This division is eminently practical, since nothing can be more variable than the circumstances under which version may be required. Before describing the steps of the operation, it may be well to consider some general conditions applicable to all cases alike.

Position of
the patient.

In this country the ordinary position on the left side is usually employed. On the Continent and in America the patient is placed on her back, with the legs supported by assistants, as in lithotomy. The former position is preferable, not only as a matter of custom, and as involving much less fuss and exposure of the person, but because it admits of both the operator's hands being more easily used in concert. In certain difficult cases, when the liquor amnii has escaped, and the back of the child is turned towards the spine of the mother, the dorsal decubitus presents some advantages in enabling the hand to pass more readily over the body of the child; but such cases are comparatively rare. The patient should be brought to the side of the bed, across which she should be laid, with the hips projecting over, and parallel to, the edge, the knees being flexed towards the abdomen, and separated from each other by a pillow, or by an assistant. Assistants should also be placed so as to restrain the patient if necessary, and prevent her involuntarily starting from the

operator, as this might not only embarrass his movements, but be the cause of serious injury.

The exhibition of anæsthetics is peculiarly advantageous. There is nothing which tends to facilitate the steps of the process so much as stillness on the part of the patient, and the absence of strong uterine contraction. When the vagina is very irritable and the uterus firmly contracted round the body of the child, complete anæsthesia may enable us to effect version, when without it we should certainly fail,

Adminis-
tration of
anæsthe-
tics.

The most favourable time for operating is when the os is fully dilated, before, or immediately after, the rupture of the membranes and the discharge of the liquor amnii. The advantage gained by operating before the waters have escaped cannot be overstated, since we can then make the child rotate with great facility in the fluid medium in which it floats. In the ordinary operation, in which the hand is passed into the uterus, it is essential to wait until the os is of sufficient size to admit its being introduced with safety. This may generally be done when the os is the size of a crown piece, especially if it be soft and yielding.

Period
when the
operation
should be
under-
taken.

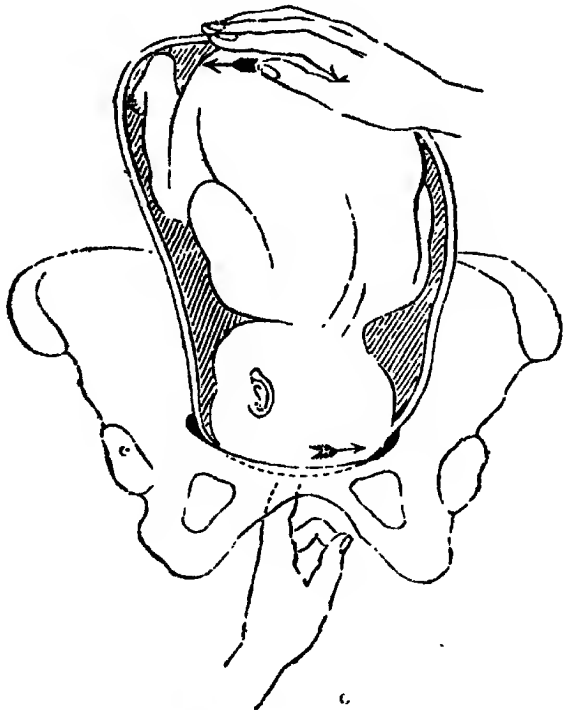
The practice followed with regard to the hand to be used in turning varies considerably. Some accoucheurs always employ the right hand, others the left, and some one or other according to the position of the child. In favour of the right hand, it is said that most practitioners have more power with it, and are able to use it with greater gentleness and delicacy. In transverse presentations, if the abdomen of the child be placed anteriorly, the right hand is said to be the proper one to use, on account of the greater facility with which it can be passed over the front of the child; and in difficult cases of this kind, when we are operating with the patient on her back, it certainly can be employed with more precision than the left. In all ordinary cases, however, the left hand can be introduced much more easily in the axis of the passages, the back of the hand adapts itself readily to the curve of the sacrum, and, even when the child's abdomen lies anteriorly, it can be passed forwards without difficulty so as to seize the feet. These advantages are sufficient to recommend its use, and very little practice is required to enable the practitioner to manipulate with it as freely as with the right. If, in

Choice of
hand to be
used.

Reasons
for gene-
rally using
the left
hand.

addition, we remember the important fact that the right hand is required to operate on the foetus through the abdominal walls—and this is a point which should never be forgotten—we shall have abundant reasons for laying it down as a rule that the left hand should generally be employed. Before passing the hand and arm they should be freely lubricated, with the exception of the palm, which is left untouched to admit of a firm grasp being taken of the foetal

Fig. 138.



FIRST STAGE OF BI-POLAR VERSION.
ELEVATION OF THE HEAD AND DEPRESSION OF THE BURECH.

limbs. It is also advisable to remove the coat, and bare the arm as high as the elbow.

As it should be a cardinal rule to resort to the simplest procedure when practicable, in describing podalic version it will be well to consider first the method by combined external and internal manipulation, without passing the hand into the uterus, and subsequently that which involves the introduction of the hand.

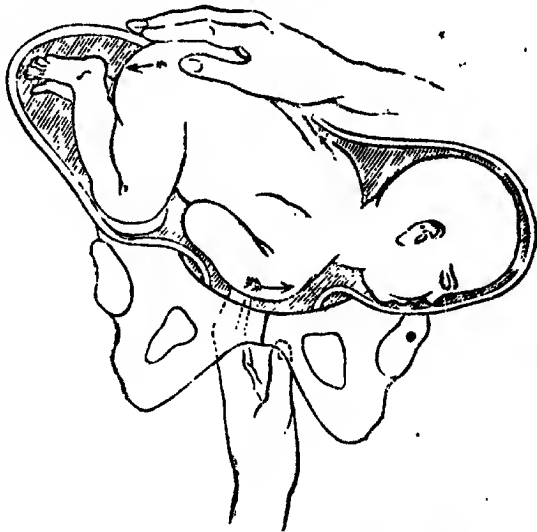
To effect podalic version by the combined method it is

an essential preliminary to ascertain the situation of the foetus as accurately as possible. It will generally be easy, in transverse presentation, to make out the breech and the head by palpation; while, in head presentations, the fontanelles will show to which side of the pelvis the face is turned. The left hand is then to be passed carefully into the vagina, in the axis of the canal, to a sufficient extent to admit of the fingers passing freely into the cervix. To effect this, it is not always necessary to insert the whole hand, three or four fingers being generally sufficient.

Turning by combined external and internal manipulation.

If the head lie in the first or fourth position, push it upwards and to the left; while the other hand, placed exter-

Fig. 139.

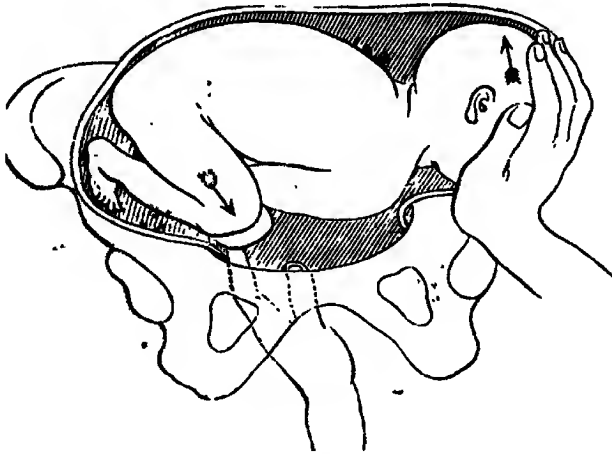


SECOND STAGE OF BI-POLAR VERSION.
ELEVATION OF THE SHOULDERS AND DEPRESSION OF THE BREECH.

nally on the abdomen, depresses the breech towards the right (fig. 138). By this means we act simultaneously on both extremities of the child's body, and easily alter its position. The breech is pushed down gently but firmly, by gliding the hand over the abdominal wall. The head will now pass out of reach, and the shoulder will arrive at the os, and will lie on the tips of the fingers. This is similarly pushed upwards in the same direction as the head (fig. 139), the breech at the same time being still further depressed, until the knee comes within reach of the fingers, when (the membranes being now ruptured, if still unbroken), it is seized and pulled

down through the os (fig. 140). Occasionally the foot comes immediately over the os, when it can be seized instead of

Fig. 140.



THIRD STAGE OF BI-POLAR VERSION.
SEIZURE OF THE KNEE AND PARTIAL ELEVATION OF THE HEAD.

the knee." Version may be facilitated by changing the po-

Fig. 141.



FOURTH STAGE OF BI-POLAR VERSION.
DRAWING DOWN OF LEG AND COMPLETION OF VERSION.

sition of the external hand, and pushing the head upwards from the iliac fossa, instead of continuing the attempt to

depress the breech (fig. 141). These manipulations should always be carried on in the intervals, and desisted from when the pains come on; and when they recur with great force and frequency, the advantage of chloroform will be particularly apparent. In the second and third positions, the steps of the operation should be reversed; the head is pushed upwards and to the right, the breech downwards and to the left. When the position cannot be made out with certainty, it is well to assume that it is the first, since that is the one most frequently met with; and even if it be not, no great inconvenience is likely to occur. If the os be not sufficiently open to admit of delivery being concluded, the lower extremity can be retained in its new position with one finger, until dilatation is sufficiently advanced, or until the uterus has permanently adapted itself to the altered position of the child, either of which results will generally be effected in a short space of time.

In transverse presentations the same means are to be adopted, the shoulder being pushed upwards in the direction of the head, while the breech is depressed from without. This is frequently sufficient to bring the knees within reach, especially if the membranes be entire, but version is much facilitated by pressing the head upwards from without, alternately with depression of the breech. If the liquor amnii have escaped, and the uterus be firmly contracted round the body of the child, it will be found impossible to effect an alteration in its position without the introduction of the hand, and the ordinary method of turning must be employed. The peculiar advantage of the combined process is, that it in no way interferes with the latter, for should it not succeed the hand can be passed on into the uterus without withdrawal from the vagina (provided the os be sufficiently dilated), and the feet or knees seized and brought down.

Turning, with the hand introduced into the uterus, provided the waters have not escaped, or have only recently done so, and the os be sufficiently dilated, is an operation generally performed with extreme facility.

The first step, and one of the most important, is the introduction of the hand and arm. The fingers having been pressed together in the form of a cone, the thumb lying between the rest of the fingers, the hand, thus reduced

Podalic version when the hand is introduced into the uterus. Introduction of the hand.

to the smallest possible dimensions, is slowly and carefully passed into the vagina, in the axis of the outlet, in an interval between the pains, and passed onwards in the same cautious manner, and with a semi-rotatory motion, until it lies entirely within the vagina, the direction of introduction being gradually changed from the axis of the outlet to that of the brim. If uterine contractions come on, the hand should remain passive until they are over. It should ever be borne in mind, as one of the fundamental rules in performing version, that we should act only in the absence of pains, and then with the utmost gentleness—all force and violent pushing being strictly avoided. The hand, still in the form of a cone, having arrived at the os, if this be sufficiently dilated, may be passed through at once. If the os be not quite open, but dilatable, the points of the fingers may be gently insinuated, and occasionally expanded, so as to press it open sufficiently to permit the rest of the hand to pass. While this is being done, the uterus should be steadied by the other hand placed externally, or by an assistant. If the presentation should not previously have been made out with accuracy, we can now positively ascertain how to pass the hand onwards, so that its palmar surface may correspond with the abdomen of the child.

Rupture
of the
mem-
branes.

The membranes should now be ruptured—if possible during the absence of a pain—so as to prevent the waters being forced out. The hand and arm form a most efficient plug, and the liquor amnii cannot escape in any quantity. Some practitioners recommend that, before rupturing the membranes, the hand should be passed onwards between them and the uterine walls, until we reach the situation of the feet. By so doing we run the risk of occasionally forcibly separating the placenta; besides we have to introduce the hand much further than is necessary, since the knees are often found lying quite close to the os. As soon as the membranes are perforated, the hand can be passed on in search of the feet (fig. 142). At this stage of the operation increased care is necessary to avoid anything like force; and should a pain come on, the hand must be kept perfectly flat and still, and rather pressed on the body of the child than on the uterus. If the pains be strong, much inconvenience may be felt from the compression; and, were the onward movement con-

tinued, or the hand even kept bent in the conical form in which it was introduced, rupture of the uterine walls might easily be caused. This is not likely to occur in the class of cases now under consideration, for it is chiefly when the waters have long escaped that the progress of the hand is a matter of difficulty. Valuable assistance may now be given by pressing the breech downwards from without, so as to bring the knees or feet more easily within the reach

Fig. 142.



SEIZURE OF THE FEET WHEN THE HAND IS INTRODUCED INTO THE UTERUS.

of the internal hand. Having arrived at the ~~knees or feet~~, they may be seized between the fingers, and drawn downwards in the absence of a pain (fig. 143). This will cause the fœtus to revolve on its axis, the breech will descend, and, at the same time, the ascent of the head may be assisted by the right hand from without. It is a question with many accoucheurs which part of the inferior extremities should be seized and brought down. Some recommend us to seize both feet, others prefer one only, while some advise the seizure

Seizure of
the knee
or foot.

Advantage
of seizing
one knee.

of one or both knees. In a simple case of turning, before the escape of the waters, it does not much matter which of these plans is followed, since version is accomplished with the greatest ease by any one of them. The seizure of the knee, however, instead of the feet, offers certain advantages which should not be overlooked. It is generally more accessible, affords a better hold (the fingers being inserted in

Fig. 143.

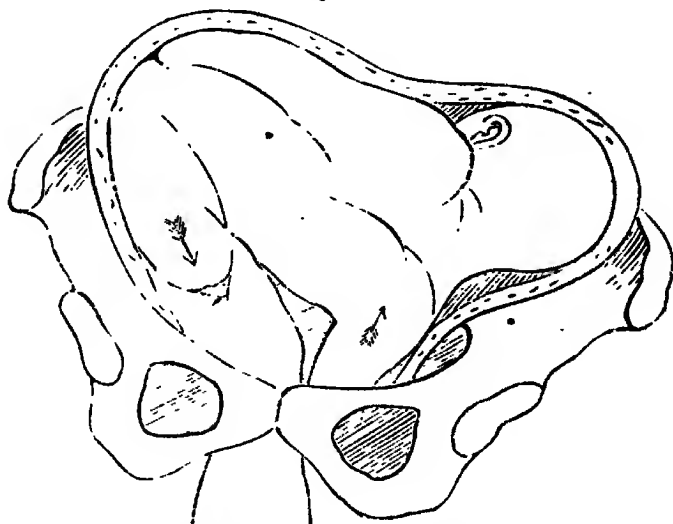


DRAWING DOWN OF THE FEET AND COMPLETION OF VERSION.

the flexure of the ham), and, being nearer the spine, traction acts more directly on the body of the child. Any danger of mistaking the knee for the elbow may be obviated by remembering the simple rule that the salient angle of the former looks towards the head of the child, of the latter towards its feet. Certain advantages may also be gained by bringing down one foot or knee only, instead of both. When one inferior extremity remains flexed on the body of the child, the part which has to pass through the os.

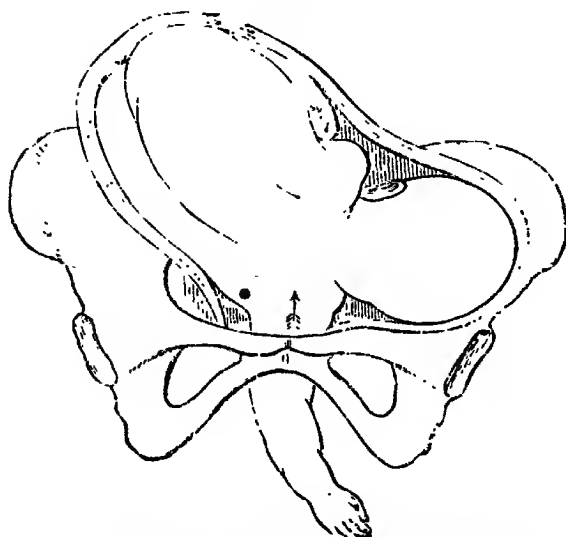
is larger than when both legs are drawn down, and consequently the os is more perfectly dilated, and less difficulty

Fig. 144.



SHOWING THE ERROR OF ATTEMPTING TO TURN BY SEIZING THE LEG OF THE SAME SIDE AS THE PRESENTING SHOULDER.

Fig. 145.



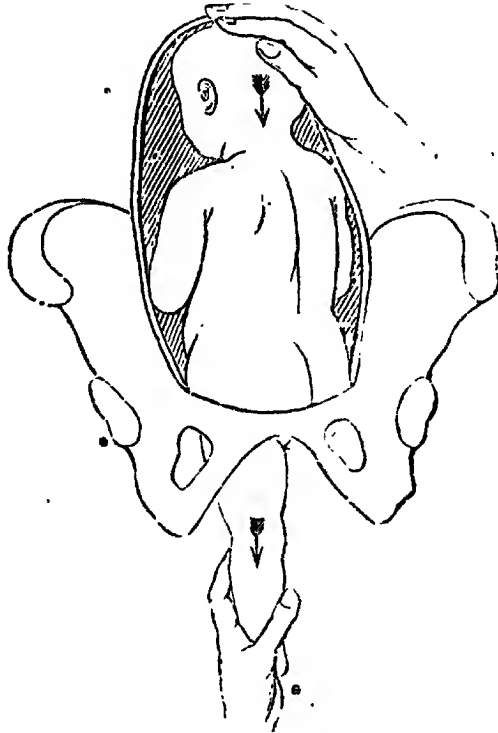
SHOWING THAT VERSION IS MOST READILY EFFECTED BY BRINGING DOWN THE KNEE OF THE OPPOSITE SIDE TO THAT OF THE PRESENTING SHOULDER.

is likely to be experienced in the delivery of the rest of the body, so that the risk to the child is materially diminished. In arm presentation it is advisable to bring

In transverse presentations the knee opposite the presenting arm should be brought down.

down, if possible, the knee farthest from and opposite to the presenting arm, for by this means the body is turned round on its own longitudinal axis, and the presenting arm or shoulder more easily withdrawn from the os. This point is well illustrated in the accompanying diagrams (figs. 144 and 145) from Dr. Barnes' work, which show not only the error of drawing down the leg of the same side as the presenting arm, but the advantage to be derived from the opposite course.

Fig. 146.



SHOWING THE COMPLETION OF VERSION.

Management of the case after version.

As soon as the head has reached the fundus, and the lower extremity is brought through the os, the case is converted into a foot or knee presentation, and it comes to be a question whether delivery should now be left to nature or terminated by art. This must depend to a certain extent on the case itself, and on the cause which necessitated version, but generally it will be advisable to finish delivery without unnecessary delay. To accomplish this, downward traction is made during the pains, and desisted from in the in-

tervals (fig. 146). As the umbilical cord appears, a loop should be drawn down; and if the hands be above the head, they must be disengaged and brought over the face, in the same manner as in an ordinary footling presentation. The management of the head, after it descends into the cavity of the pelvis, must also be conducted as in labours of that description.

In cases of placenta prævia the os will, as a rule, be more easily dilatable than in transverse presentations. Dr. Hicks' method offers the great advantage of enabling us to perform version much sooner than was formerly possible, since it only requires the introduction of one or two fingers into the os uteri. Should we not succeed by it, and the state of the patient indicates that rapid delivery is necessary, we have at our command, in the fluid dilators, a means of artificially dilating the os uteri which can be employed with ease and safety. If we have to do with a case of entire placental presentation, the hand should be passed at that point where the placenta seems to be least attached. This will always be better than attempting to perforate its substance, a measure sometimes recommended, but more easily performed in theory than in practice. If the placenta should only partially present, the hand should, of course, be inserted at its free border. It will frequently be advisable not to hasten delivery after the feet have been brought through the os, for they form of themselves a very efficient plug, and effectually prevent further loss of blood; while, if the patient be much exhausted, she may have her strength recruited by stimulants, &c., before the completion of delivery.

Turning in
placenta
prævia.

In abdomino-anterior positions, in which the waters have escaped, and in which, therefore, some difficulty may be reasonably anticipated, the operation is generally more easily performed with the patient on her back; the right hand is then introduced into the uterus, and the left employed externally (fig. 147). In this way the internal hand has to be passed a shorter distance, and in a less constrained position. The operator then sits in front of the patient, who is supported at the edge of the bed in the lithotomy position with the thighs separated, and the right hand is passed up behind the pubis, and over the abdomen of the child.

Turning in
abdomino-
anterior
positions.

The difficulties of turning culminate in those unfavour-

Difficult
cases of
arm pre-
sentation.

able cases of arm presentation in which the membranes have been long ruptured, the shoulder and arm pressed down into the pelvis, and the uterus contracted round the body of the child. The uterus being firmly and spasmodically contracted, the attempt to introduce the hand often only makes matters worse, by inducing more frequent and stronger pains. Even if the hand and arm be successfully passed, much difficulty is often experienced in causing the body of the child to rotate; for we have no longer the fluid medium present in which it floated and moved with ease, and the arm

Fig. 147.



SHOWING THE USE OF THE RIGHT-HAND IN ABDOMINO-ANTERIOR POSITION.

of the operator may be so cramped and pained, by the pressure of the uterine walls, as to be rendered almost powerless. The risk of laceration is also greatly increased, and the care necessary to avoid so serious an accident adds much to the difficulty of the operation.

Value of
anæsthesia
in relaxing
the uterus.

In these perplexing cases various expedients have been tried to cause relaxation of the spasmodically contracted uterine fibres, such as copious venesection in the erect attitude until fainting is induced, warm baths, tartar emetic, and similar depressing agents. None of these, however, are so useful as the free administration of chloroform, which has

practically superseded them all, and often answers most effectually when given to its full surgical extent.

The hand must be introduced with the precautions already described. If the arm be completely protruded into the vagina, we should pass the hand along it as a guide, and its palmar surface will at once indicate the position of the child's abdomen. No advantage is gained by amputation, or attempting to replace it, as is sometimes recommended. When the os is reached, the real difficulties of the operation commence, and, if the shoulder be firmly pressed down into the brim of the pelvis, it may not be easy to insinuate the hand past it. It is allowable to repress the presenting part a little, but with extreme caution, for fear of injuring the contracted uterine parietes. It is better to insinuate the hand past the obstruction, which can generally be done by patient and cautious endeavours. Having succeeded in passing the shoulder, the hand is to be pressed forward in the intervals, being kept perfectly flat and still on the body of the foetus when the pains come on. It is much safer to press on it than on the uterine walls, which might readily be lacerated by the projecting knuckles. When the hand has advanced sufficiently far, it will be better, for the reasons already mentioned, to seize and bring down one knee only, and that the one farthest from and opposite to the presenting shoulder.

Mode of
procedure.

Even when the foot has been seized and brought through the os, it is by no means always easy to make the child revolve on its axis, as the shoulder is often so firmly fixed in the pelvic brim as not to rise towards the fundus. Some assistance may be derived from pushing the head upwards from without, which of course would raise the shoulder along with it. If this should fail, we may effect our object by passing a noose of tape or wire ribbon round the limb which has been drawn through the os, by which traction is made downwards and backwards; at the same time, the other hand is passed into the vagina to displace the shoulder and push it out of the brim. It is evident that this cannot be done as long as the limb is held by the left hand, as there is no room for both hands to pass into the vagina at the same time. By this manœuvre version may be often completed, when the child has refused to turn in the ordinary way.

Management of
cases in
which the
foot is
brought
down but
the foetus
will not
revolve.

Various instruments have been invented, both for passing a lac round the child's limb, and for repressing the shoulder,¹ but none of them can compete, either in facility of use or safety, with the hand of the accoucheur.

If all attempts at version fail, mutilation of the fœtus is necessary.

Should all attempts at version fail, no resource is left but the mutilation of the child, either by evisceration or decapitation. This extreme measure is, fortunately, seldom necessary, as with due care version may generally be effected, even under the most unfavourable circumstances.

CHAPTER III.

THE FORCEPS.

OF all obstetric operations the most important, because the most truly conservative both to the mother and child, is the application of the forceps. In modern midwifery the use of the instrument is much extended, and it is now applied by some of our most experienced accoucheurs with a frequency which older practitioners would have strongly reprobated. That the injudicious and unskilful use of the forceps is capable of doing much harm no one will for a moment deny. This, however, is not a reason for rejecting the recommendations of those who advise a more frequent resort to the operation, but rather for urging on the practitioner the necessity of carefully studying the manner of performing it, and of making himself familiar with the cases in which it is easy or the reverse. Nothing but practice—at first on the dummy and afterwards in actual cases—can impart the operative dexterity which it should be the aim of every obstetrician to acquire, and without which there can be no assurance of his doing his duty to his patient efficiently.

Frequent
use of the
forceps in
modern
practice.

• The forceps may best be described as a pair of artificial hands, by which the foetal head may be grasped and drawn through the maternal passages by a *vis a fronte*, when the *vis a tergo* is deficient. This description will impress on the mind the important action of the instrument as a tractor, to which all its other powers are subservient. The forceps consist of two separate blades of a curved form, adapted to fit the child's head; a lock by which the blades are united after introduction; and handles which are grasped by the operator, and by means of which traction is made. It would be a wearisome and unsatisfactory task to dwell on all the modifications of the instrument which have been made, which are so numerous as to make it almost appear as if no one could practise midwifery with the least pretension to

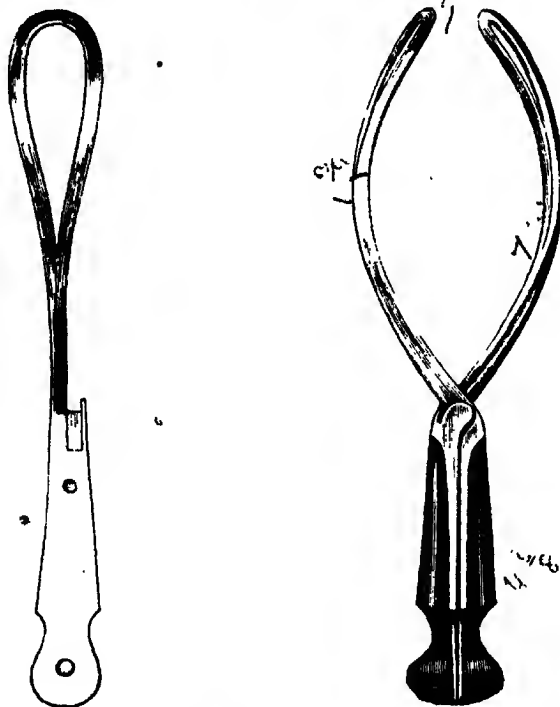
Description
of the
instru-
ment.

eminence, unless he has attached his name to a new variety of forceps.

The short
forceps.

The original instrument, invented by the Chamberlaynes, may be looked upon as a type of the short straight forceps, which have been more employed than any other, and which, perhaps, find their best representative in the short forceps of Denman (fig. 148). Indeed the only essential difference between the two is the lock of the latter, originally invented by Smellie, which is so excellent that it has been adopted in

Fig. 148.



DENMAN'S SHORT FORCEPS.

Denman's
forceps.

all British forceps; and which, for facility of juncture, is much superior to either the French pivot, or the German lock, while for firmness it is, for all practical purposes, as good as either. In this instrument the blades are 7, the handles $4\frac{3}{4}$ inches in length; the extremities of the blades are exactly 1 inch apart, and the space between them, at their widest part, is $2\frac{1}{2}$ inches. The blades measure $1\frac{1}{4}$ inches at their greatest breadth, and spring with a regular sweep directly from the lock, there being no shank. The blades, as in all

forceps, are formed of the best and most highly tempered steel, to resist the strain to which they are occasionally subjected, and they are smoothed and rounded on their inner surface, to diminish the risk of injury to the scalp of the child.

The special advantage claimed for this form of instrument is, that, the two halves being precisely similar, no care or forethought is required on the part of the practitioner as to which blade should be introduced uppermost—an advantage of no great value, since no one should undertake a case of forceps delivery who has not sufficient knowledge of the operation, and presence of mind enough, to obviate any risk from the introduction of the wrong blade first. On account of its shortness, and the want of the second or pelvic curve, it is only adapted for cases in which the head is low down in the pelvis, or actually resting on the perinæum.

Advantages claimed for this form of instrument.

The question of the second or pelvic curve is one on which there is much difference of opinion. The forceps we are now considering, and the many modifications formed on the same plan, are constructed solely with reference to their grasp on the child's head, and without regard to the axes of the maternal passages into which they have to be passed, and through which they have to be drawn. Consequently were we to introduce them when the head was at the upper part of the pelvis, we could not fail to expose the soft parts to the risk of contusion, and (in consequence of the necessity of drawing more directly backwards), unduly stretch and even lacerate the perinæum. Hence it is now admitted by obstetricians, with few exceptions, that the second curve is essential before the complete descent of the head, although it is not absolutely so after this has taken place. The only circumstances under which a straight blade can possess any superiority are in certain cases of occipito-posterior position, in which it is found necessary to rotate the head round a large extent of the pelvis, when the circular sweep of a strongly-curved instrument might prove injurious. Such cases, however, are of rare occurrence, and need in no way influence the general employment of the pelvic curve.

The pelvic curve, its advantages.

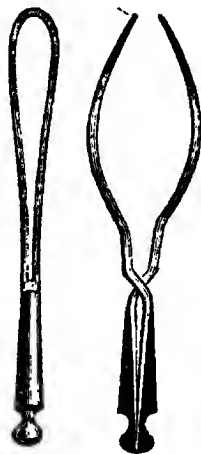
Circumstances in which a straight forceps may be necessary.

The short forceps, usually employed in Scotland, are the invention of the late Dr. Zeigler (fig. 149), and are useful from the facility with which the blades may be introduced in

Zeigler's forceps.

accurate apposition to each other, a point which in practice is of no little value. In general size and appearance they closely resemble Denman's forceps, but the fenestrum of the lower blade is continued down to the handle. In introducing, the lower blade is slipped over the handle of the other blade already *in situ*, and thus it is guided with great certainty into a proper position, locking itself as it passes on. This instrument has the disadvantage of not having the second curve, but the facility of introduction has rendered it a great favourite with many who have been in the habit of employing it.

Fig. 149.



ZEIGLER'S FORCEPS.

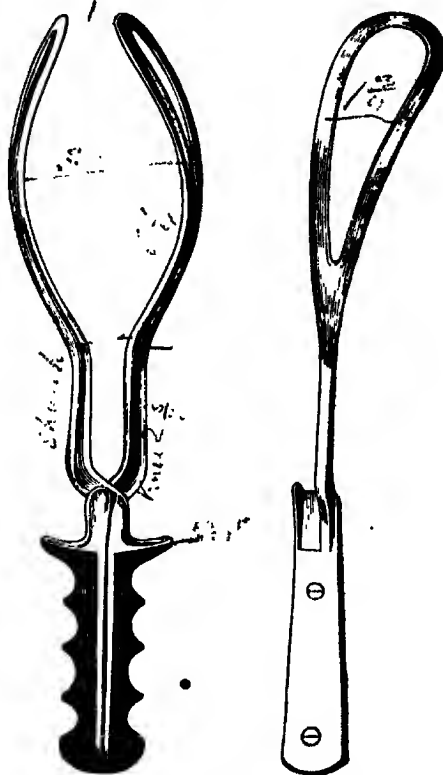
The long
forceps.

Simpson's
forceps.

For cases in which the head is not on the perinæum, or at least not quite low in the pelvis, a longer instrument is essential. To meet this indication Smellie invented the long forceps, which, like the shorter instrument, have been very variously modified. The most perfect instrument of the kind employed in this country is that known as Simpson's forceps (fig. 150), which combine many excellent points selected from the forceps of various obstetricians, as well as some original additions, and which, as a whole, have never been surpassed. The curved portions of the blades are $6\frac{1}{4}$ inches long, the fenestrum measuring $1\frac{1}{4}$ inches at its widest part. The extremities of the blades are 1 inch asunder when the handles are closed, and 3 inches at their widest part. The object of this somewhat unusual width is to lessen the compressing power of the instrument, without in any way interfering with its action as a tractor. The pelvic curve is less than in most long forceps, so as to admit of the rotation of the head when necessary, without the risk of injuring the maternal structures. Between the curve of the blade and the lock is a straight portion or shank, measuring $2\frac{3}{8}$ inches, which, before joining the handle, is bent at right angles into a knee. This shank is a useful addition to all forceps, and is essential in long forceps to ensure the junction of the blades beyond the parts of the mother, which might otherwise be caught in the lock and injured. The knees serve the purpose of preventing the blades from slipping from each other after they have been

united. They also admit of one finger being introduced above the lock, and used as an aid in traction; a provision which is made in some other varieties of long forceps by a semicircular bend in each shank. The handles, which in most British forceps are too small and smooth to afford a firm grasp, are serrated at the edge, and flattened from before backwards, so as to fit the closed fist more accurately. At their extremities, near the lock, there are a pair of pro-

Fig. 150.



SIMPSON'S FORCEPS.

jecting rests, over which the fore and middle fingers may be passed in traction, and which greatly increase our power over the instrument. Although this and other varieties of the long forceps are specially constructed for application when the head is high in the pelvis, they answer quite as well as the short forceps—indeed, in most respects better—when it has descended low down. It is a decided advantage for the practitioner to habituate himself to the use of one instru-

Long forceps are suitable to all cases of forceps delivery.

ment, with the application and power of which he becomes thoroughly familiar. It is a mere waste of space and money for him to encumber himself with a number of instruments of various shapes and sizes, and he may be sure that a good pair of long forceps, such as Simpson's, will be suitable for every emergency, and in any position of the head.

Disadvantages of a weak instrument.

The chief argument against the use of such an instrument in simple forceps cases is its great power. This, however, is entirely based on a misconception. The existence of power does not involve its use, and the stronger instrument can be employed with quite as much delicacy and gentleness as the weaker. The remarks of Dr. Hodge¹ on this point are extremely apposite, and are well worthy of quotation. He says, 'Certainly no man ought to apply the forceps who has not sufficient discretion to use no more force than is absolutely requisite for safe delivery; if, therefore, there is more power at command he is not obliged to use it: while, on the contrary, if much power be demanded, he can, within the bounds of prudence, exercise it by the long forceps, but with the short forceps his efforts might be unavailing; moreover, in cases of difficulty, the short forceps being used, the practitioner would be forced to make great muscular efforts; while with the long forceps, owing to the great leverage, such effort will be comparatively trifling, and of course the whole force demanded can be much more delicately, and at the same time efficiently applied, and with more safety to the tissues of the child and its parent.'

Continental forceps.

The forceps usually employed on the continent, and in America, differ considerably, both in appearance and construction, from those in use in this country. As a rule they are larger and more powerful instruments, joined by a pivot or button joint, and they always possess the second or pelvic curve. Of late years Simpson's forceps have been much employed in some parts of Germany. The chief objection to the Continental instruments is their cumbrousness. This is chiefly in the handles, which in many of them are forged in a piece with the blades, the part introduced within the maternal structures not being materially different from the similar part of the English instrument.

¹ *System of Obstetrics*, p. 242.

The forceps are generally said to act in three different ways:—

Action of the instrument.

1st. *As a tractor.*

2nd. *As a lever.*

3rd. *As a compressor.*

It is more especially as a tractor that the instrument is of value, and it is used with the greatest advantage when it is employed merely to supplement the action of the uterus, which is insufficient of itself to effect delivery, or when, from some complication, it is necessary to complete labour with greater rapidity than can be accomplished by the unaided powers of nature. In most cases traction alone is sufficient; but, in order that it may act satisfactorily, and that the instrument may not slip, a proper construction of the forceps, and a sufficient curvature of the blades, are essential. The want of these is the radical fault of many of the short straight instruments in common use, which have a tendency to slip during our efforts at extraction.

The chief use of the forceps is as a tractor.

The forceps act also as a lever, but this action has been greatly exaggerated. They are generally described as a lever of the first class, the power being at the handles, the fulcrum at the lock, and the weight at the extremities. There may possibly be some leverage power of this kind when the instrument is first introduced, and the handles held so loosely that one blade is able to work on the other. But, as ordinarily used, the handles are held with a sufficiently firm grasp to prevent this movement, and then the two blades practically form a single instrument. A little consideration will show that, when thus employed, they can only act as a lever of the second class; an action which is brought into play during the side to side movements which are generally used in conjunction with traction, the fulcrum being that portion of the head on which the extremities of the blades rest, the power being at the handles, and the weight between the two. This action is doubtless occasionally of value in assisting delivery, but it must always be subservient to direct traction.

As a lever.

Regarding the compressive power of the instrument there has been much difference of opinion. There is no doubt that the forceps, especially some of the foreign instruments in which the points nearly approach each other, are capable

As a compressor.

of exerting considerable compression on the head. It is, however, extremely problematical if this action be of real value. It is to be borne in mind that in cases of protracted labour the head has been already moulded and compressed, and the bones have been made to overlap each other to their utmost extent, by the sides of the pelvis; we can scarcely, therefore, expect to diminish the head much more by the forceps, without employing an amount of force that will seriously endanger the life of the child. It is in cases of disproportion between the head and the pelvis, depending on slight antero-posterior contraction of the pelvic brim, that diminution of the child's head by compression would be most useful. Then, however, the pressure of the forceps is exerted on that portion of the head which lies in the most roomy diameter of the pelvis, where there is no want of space. If this pressure do not increase the opposite diameter, which is in apposition to the narrowed portion of the pelvis, it can at least do nothing towards lessening it; and diminution of any other part of the child's head is not required.

Dynamical action of the forceps.

The mere introduction of the forceps sometimes excites increased uterine action, through the reflex irritation induced by the presence of a foreign body in the vagina. This has been called the dynamical action of the forceps; but it cannot be looked upon in any other light than that of an occasional accidental result.

Cases requiring the use of the forceps are considered elsewhere.

The circumstances indicating the use of the forceps have been separately considered elsewhere, and to recapitulate them here would only lead to needless repetition. I shall therefore now merely describe the mode of using the instrument.

Difference between the high and low operations.

Before doing so it is well to repeat what has already been said as to the difference between what may be termed the high and low forceps operations. The application of the instrument, when the head is low in the pelvis, is extremely simple; and when there is no disproportion between the head and the pelvis, and some slight traction is alone required to supplement deficient expulsive power, the operation, in the hands of any ordinarily well-instructed practitioner, ought to be perfectly safe both to the mother and child. It is very different when the head is arrested at the

brim, or high in the pelvis. Then the application of the forceps is an operation requiring much dexterity for its proper performance, and must never be undertaken without anxious consideration. It is because these two classes of operations have been confused together, that the use of the instrument is regarded by many with such unreasonable dread.

Before attempting to introduce the forceps, there are several points to which attention should be directed :

1st. The membranes must, of course, be ruptured.

2ndly. For the safe and easy application of the instrument, it is also advisable that the os should be fully dilated, and the cervix retracted over the head. Still, these two points cannot be regarded, as many have laid down, as being *sine qua non*. Indeed we are often compelled to use the instrument when, although the os is fully dilated, the rim of the cervix can be felt at some point of the contour of the head, especially in cases in which the anterior lip is jammed between the head and the pelvic wall. Provided due care be taken to guard the cervical rim with the fingers of one hand, as the instrument is slipped past it, there need be no fear of injury from this cause. If the os be not fully dilated, but is sufficiently so to admit of the passage of the forceps, the operation, under urgent circumstances, may be quite justifiable, although it must necessarily be a somewhat anxious one.

3rdly. The position of the head should be accurately ascertained, by means of the sutures and fontanelles. Unless this be done, the operation must always be hap-hazard and unsatisfactory, as the practitioner can never be in possession of accurate knowledge of the progress of the case. It may be that the occiput is directed backwards; and, although that does not necessarily contra-indicate the application of the forceps, it involves special precautions being taken.

4thly. The bladder and bowels should be emptied.

Before proceeding to operate, the question of anæsthesia will arise. In any case likely to be difficult it is of the greatest assistance to have the patient completely under the influence of an anæsthetic to the surgical degree, so as to have her as still as possible; but, whenever this is deemed necessary, another practitioner should undertake the responsibility of the administration. In simple cases I believe it is

Preliminary considerations before their use.

Question of administering anæsthetics.

better to dispense with anæsthetics altogether, partly because they are apt to stop what pains there are, which is in itself a disadvantage, but chiefly because, under partial anæsthesia, the patient loses her self-control, is restless, and twists herself into awkward positions, which give rise to the utmost difficulty and inconvenience in the use of the instrument. Moreover, if no anaesthetic be given, the patient can assist the operator by placing herself in the most convenient attitude.

Description of the operation.

In describing the method of applying the forceps, I shall assume that we have to do with the simpler variety of the operation, when the head is low in the pelvis. Subsequently I shall point out the peculiarities of the high operation.

Position of the patient.

As to the position of the patient, I believe there can be no doubt of the superiority of that which is usually adopted in this country. On the Continent and in America the forceps are always employed with the patient lying on her back, a position involving much needless exposure of the person, and requiring more assistance from others. In certain cases of unusual difficulty the position on the back is of unquestionable utility, but we may, at least, commence the operation in the usual way, and subsequently turn the patient on her back if desirable.

Importance of a suitable position.

Much of the facility with which the blades are introduced depends on the patient's being properly placed. Hence, although it gives rise to a little more trouble at first, I believe that it is always best to pay particular attention to this point, whether the high or low forceps operation be about to be performed. The patient should be brought quite to the side of the bed, with her nates parallel to, and projecting somewhat over its edge. The body should lie almost directly across the bed, and nearly at right angles to the hips, with the knees raised towards the abdomen (fig. 151). In this way there is no risk of the handle of the upper blade, when depressed in introduction, coming in contact with the bed.

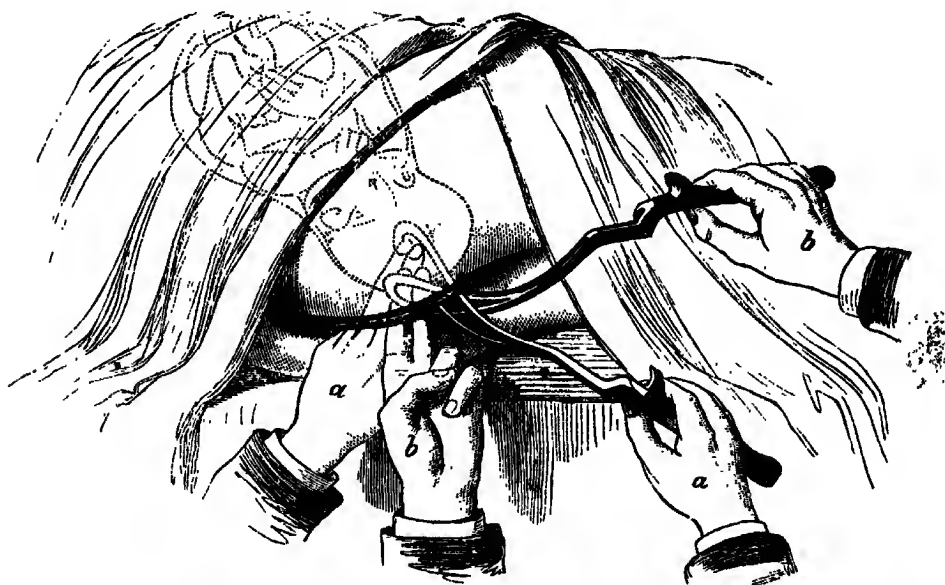
The blades should be warmed in tepid water, lubricated with cold cream, and placed ready to hand.

These preliminaries having been attended to, we proceed to the introduction of the blades, sitting by the side of the bed, opposite the nates of the patient.

The important question now arises, in what direction are the blades to be passed? The almost universal rule in our standard works is, that in most forceps operations they must be passed as nearly as possible over the child's ears, without any reference to the pelvic diameters. Hence, if the head have not made its turn, but is lying in one oblique diameter, the blades would require to be passed in the opposite oblique diameter; in short, the position of the forceps, as regards the pelvis, must vary according to the position of the head. Some

Direction in which the blades are to be introduced.

Fig. 151.



POSITION OF PATIENT FOR FORCEPS DELIVERY AND MODE OF INTRODUCING THE BLADES.
a, a UPPER BLADE. b, b LOWER BLADE.

have even laid down the rule, that the forceps are contra-indicated unless an ear can be felt; a rule that would very seriously limit their application, as in many cases in which they are urgently required it is a matter of great difficulty, and even impossibility, to feel the ear at all. It is admitted that in the high forceps operation the blades must be introduced in the transverse diameter of the pelvis, without relation to the position of the head. On the Continent it is generally recommended that this rule should be applied to all cases of forceps delivery alike, whether the head be high or low, and I have now for many years adopted this plan,

The general rule is that they should be passed over the child's ears.

It is better, however, to pass them in relation to the sides

of the
pelvis.

and passed the blades in all cases, whatever be the position of the head, in the transverse diameter of the pelvis, without any attempt to pass them over the bi-parietal diameter of the child's head. Dr. Barnes, in his standard work on obstetric operations, points out with great force that, do what we will, and attempt as we may, to pass the blades in relation to the child's head, they find their way to the sides of the pelvis, and that the marks of the fenestræ on the head always show that it has been grasped by the brow and side of the occiput. Of the perfect correctness of this observation I have no doubt; hence it is a needless element of complexity to endeavour to vary the position of the blades in each case, and one which only confuses the inexperienced practitioner, and renders more difficult an operation which should be simplified as much as possible. While, therefore, it is of importance that the precise position of the head should be ascertained in order that we may have an intelligent notion of its progress, I do not think that it is essential as a guide to the introduction of the forceps.

Method of
introducing the
lower
blade.

As a rule the lower blade, lightly grasped between the tips of the index and middle fingers and thumb, should be introduced first. Poised in this way, we have perfect command over it, and can appreciate in a moment any obstacle to its passage. Two or more fingers of the left hand are introduced into the vagina, and by the side of the head, as a guide; the greatest care must be taken, if the cervix be within reach, that they are passed within it, so as to avoid the possibility of injury.

Necessity
of gentleness in
passing
the instrument.

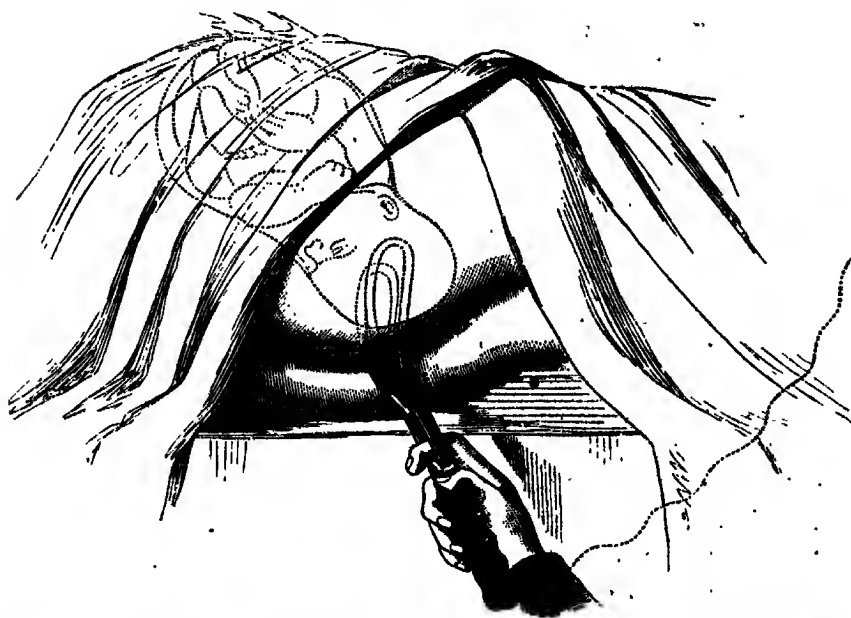
The handle of the instrument has to be elevated, and its point slid gently along the palmar surface of the guiding finger, until it touches the head (fig. 151 *b, b*). At first the blade should be inserted ~~in the axis of the outlet~~, but, as it progresses, the handle ~~must be depressed and carried backwards~~. As it is pushed onwards it is made to progress by a slight side-to-side motion, and it is of the utmost importance to bear in mind that the greatest gentleness must always be used. If any obstruction be felt, we are bound to withdraw the instrument, partially or entirely, and attempt to manœuvre, not force, the point past it. As the blade is guided on in this way, it is made to pass over the convexity of the head, the point being always kept lightly in contact

with it, until it finally gains its proper position. When fully inserted the handle is drawn back towards the perinæum, and given in charge to an assistant. The insertion must be carried on only in the intervals between the pains, and desisted from during their occurrence; otherwise there would be a serious risk of injuring the soft parts of the mother.

The second blade is passed directly opposite to the first, and is generally somewhat more difficult to introduce, in consequence of the space occupied by the latter. It is passed along two fingers directly opposite the first blade, and with

Introduc-
tion of the
upper
blade.

Fig. 152.



FORCEPS IN POSITION. TRACTION IN THE AXIS OF BRIM, DOWNWARDS AND BACKWARDS.

exactly the same precautions as to direction and introduction, except that at first its handle has to be depressed instead of elevated (fig. 151 a, a).

The handle which was in charge of the assistant is now laid hold of by the operator, and the two handles are drawn together. If the blades have been properly introduced, there should be no difficulty in locking; but, should we be unable to join them easily, we must withdraw one or other, either partially or entirely, and re-introduce it with the same precautions as before. We must also assure ourselves that

Locking of
the
handles.

no hairs, or any of the maternal structures, are caught in the lock.

Method of traction.

When once the blades are locked we may commence our efforts at traction. To do this we lay hold of the handles with the right hand, using only sufficient compression to give a firm grasp of the head and keep the blades from slipping. The left hand may be advantageously used in assisting and supporting the right during our efforts at extraction, and, at a late stage of the operation, may be employed in relaxing the perinæum when stretched by the head of the child. Traction must always be made in reference to the pelvic axes; being at first backwards towards the perinæum, (fig. 152) in the direction of the axis of the brim, and as the head descends and the vertex protrudes through the vulva, it must be changed to that of the outlet. We must extract only during the pains; and, if these should be absent, we must imitate them by acting at intervals. This is a point which deserves special attention, for there is no more common error than undue hurry in delivery. The only valid objection I know of against a more frequent resort to the forceps in lingering labours is, that the sudden emptying of the uterus, in the absence of pains, may predispose to hæmorrhage; and it cannot be denied that it is one of some weight. However, if due care be taken to operate slowly, and to allow several minutes to elapse between each tractive effort, while, at the same time, uterine contractions be stimulated by pressure and support, this need not be considered a contra-indication. Besides direct traction we may impart to the instrument a gentle waving motion from handle to handle, which brings into operation its power as a lever; but this must not be done to any great extent, and must always be subservient to direct traction.

Necessity of avoiding undue haste in delivery.

Slide to the movement.

Descent of the head.

The rotation from the oblique diameter takes place spontaneously.

Proceeding thus in a slow and cautious manner, carefully regulating the force employed according to the exigencies of the case, we shall perceive that the head begins to descend; and its progress should be determined, from time to time, by the fingers of the unemployed hand.

When the head lies in the oblique diameter, as it descends, in consequence of its perfect adaptation to the pelvic cavity, it will turn into the antero-posterior diameter without any effort on the part of the operator, provided only that the

traction be sufficiently slow and gradual. As the head is about to emerge, it is necessary to raise the handles towards the mother's abdomen. More than usual care is required to prevent laceration of the perinæum, which is always much stretched (fig. 153). If, as often happens, the pains have now increased, and the perinæum be very thin and tense, it may even be desirable to remove the blades gently, and leave the case to be terminated by the natural powers; but if due precautions are used this need not be necessary.

Birth of the head.

The peculiarities of forceps delivery in occipito-posterior

Fig. 153.



LAST STATE OF EXTRACTION. THE HANDLES OF THE FORCEPS TURNED UPWARDS TOWARDS THE MOTHER'S ABDOMEN.

positions have already been discussed (vol. i. p. 377), and need not be repeated.

When the high forceps operation has been decided on, the passage of the blades will be found to be much more difficult from the height of the presenting part, the distance which they must pass, and, in some cases, from the mobility of the head interfering with their accurate adaptation. The general principles of introduction and of traction are, however, identical. If the operation be attempted before the head has entered the pelvic brim, it must be fixed, as much as

The forceps in occipito-posterior positions. High forceps operations.

Their
peculiar-
ties.

possible, by abdominal pressure. In guiding the blades to the head special care must be taken to avoid any injury of the soft parts, especially if the cervix be not completely out of reach. For this purpose it may even be advisable to introduce the entire left hand as a guide, so as to avoid any possibility of injuring the cervix, from not passing the instrument under its edge.

Peculiar
method of
intro-
ducing the
blades.

Some authors advise that, in such cases, the blade should be introduced at first opposite the sacrum, until the point approaches its promontory. It is then made to sweep round the pelvis, under the protecting fingers, till it reaches its proper position on the head. This plan is advocated by Ramsbotham, Hall Davis, and other eminent practical accoucheurs, and it is certainly of service in some cases of difficulty; especially when, from any reason, it is not possible to draw the nates over the edge of the bed, when the necessary depression of the handle of the upper blade is difficult to effect. It involves, however, a somewhat complicated manoeuvre, and it is seldom that the blades cannot be readily introduced in the usual way.

Necessity
of care in
locking.

In locking the slightest approach to roughness must be carefully avoided, for the extremities of the blades are now within the cavity of the uterus, and serious injury might easily be inflicted. If difficulty be met with, rather than employ any force, one of the blades should be withdrawn, and re-introduced in a more favourable direction. If the blades have shanks of sufficient length, there should be no risk of including the soft parts of the mother in the lock, which, in a badly constructed instrument, is an accident not unlikely to occur.

Method of
traction.

After junction traction must at first be altogether in the axis of the brim, and to effect this the handles must be pressed well backwards towards the perinæum. As the head descends it will probably take the usual turn of itself, without effort on the part of the operator, and the direction of the tractive force may be gradually altered to that of the axis of the outlet.

If the pains be strong and regular, and there be no indication for immediate delivery, we may remove the forceps after the head has descended upon the perinæum, and leave the conclusion of the case to nature. This course may be

especially advisable if the perinæum and soft parts be unusually rigid; but generally it is better to terminate the labour without removing the instrument.

Before concluding this subject, reference may be made to the possible dangers of the operation. I would here again insist on the importance of distinguishing between the high and low forceps operations, which have been so unfortunately and unfairly confounded. Reasons have already been given for rejecting the statistics of the risks attending forceps delivery in the latter class of cases (p. 15). A formidable catalogue of dangers, both to the mother and child, might easily be gathered from our standard works on obstetrics. Among the former the principal are lacerations of the uterus, vagina, and perinæum; rupture of varicose veins, giving rise to thrombus; pelvic abscess, from contusion of the soft parts; subsequent inflammation of the uterus or peritoneum; tearing asunder of the joints and symphyses; and even fracture of the pelvic bones. A careful analysis of these, such as has been so well made by Drs. Hicks and Phillips,¹ proves beyond doubt that the application of the instrument is not so much concerned in their production, as the protraction of the labour, and the neglect of the practitioner in not interfering sufficiently soon to prevent the occurrence of the evil consequences afterwards attributed to the operation itself. Many of these will be found to arise from the prolonged pressure on the soft parts within the pelvis, and the subsequent inflammation or sloughing. To these causes may be referred with propriety most cases of vesico-vaginal fistula (p. 133), peritonitis, and metritis following instrumental labour.

Possible dangers of forceps delivery.

Most of these are not referable to the operation itself.

Lacerations and similar accidents may, however, result from an incautious use of the instrument. Slight lacerations of the mucous membrane of the vagina are probably far from uncommon. But if these cases were closely examined, it would be found that the fault lay not in the instrument, but in the hand that used it. Either the blades were introduced without due regard to the axes of the pelvis, or they were pushed forwards with force and violence, or an instrument was employed unsuitable to the case (such as a short straight forceps when the head was high in the pelvis), or undue

Some depend on ignorance on the part of practitioner.

¹ *Obst. Trans.* vol. xiii.

haste and force in delivery were used. It would be manifestly unfair to lay the blame of such results upon the forceps, which, in the hands of a more judicious and experienced practitioner, would have effected the desired object with perfect safety. The instrument is doubtless unsafe in the hands of any one who does not understand its use, just as the scalpel or amputating knife would be in the hands of a rash and inexperienced surgeon. The lesson to be learnt seems to be clearly, not that the dangers should deter us from the use of the forceps, but that they should induce us to study more carefully the cases in which they are applicable, and the method of using them with safety.

Possible
risks to the
child.

The dangers to the child are principally, lacerations of the integuments of the scalp and forehead; contusion of the face; partial, but temporary, paralysis of the face from pressure of the blade on the facial nerve; depression or fracture of the cranial bones; injury to the brain from undue pressure of the blades. These evils are of the rarest possible occurrence, and when they do happen, generally result from improper management of the operation—such as undue compression, the use of improper instruments, or excessive and ill-directed efforts at traction—and cannot, therefore, be considered inherent defects of the instrument. Many of the more common results, such as slight abrasions of the scalp, or paralysis of the face, are transitory in their nature, and of no real consequence; and the possibility of their occurrence cannot be considered as in any way contra-indicating an operation otherwise called for.

CHAPTER IV.

THE VECTIS.—THE FILLET.

IN connection with the subject of instrumental delivery it is essential to say something of the use of the *vectis*, on account of the value which was formerly ascribed to it, which was at one time so great in this country that it became the favourite instrument in the metropolis; Denman saying of it that even those who employed the forceps were 'very willing to admit the equal, if not superior, utility and convenience of the *vectis*.' Even at the present day, there are practitioners of no small practical experience who believe it to be of occasional great utility, and use it in preference to the forceps in cases in which slight assistance only is required. In spite, however, of occasional attempts to recommend its use, the instrument has fallen into disfavour, and may be said to be practically obsolete.

The *vectis* was formerly much used in this country.

The *vectis*, in its most approved form, consists of a single blade, not unlike that of a short straight forceps, attached to a wooden handle. A variety of modifications exist in its shape and size. The handle has been occasionally manufactured, for the convenience of carriage, with a hinge close to the commencement of the blade (fig. 154), or with a screw at the point where the handle and blade join. The power of the instrument, and the facility of introduction, depend very much on the amount of curvature of the blade. If this be decided, a firmer hold of the head is taken and greater tractive force is obtained, but the difficulty of introduction is increased.

Nature of the instrument.

The *vectis* is used either as a lever or a tractor. When employed in the former way, the fulcrum is intended to be the hand of the operator; but the risk of using the maternal structures as a *point d'appui*, and the inevitable danger of contusion and laceration which must follow, constitute one of the chief objections to the operation. Its value as a tractor

The *vectis* is used either as a lever or tractor.

must always be limited, and quite inferior to that of forceps, while it is as difficult to introduce and manipulate.

Cases in which it is applicable.

The vectis has been recommended in cases in which the low forceps operation is suitable, provided the pains have not entirely ceased. There is no doubt that it may be quite capable of overcoming a slight impediment to the passage of the head. It is passed over various parts of the head, most commonly over the occiput, in the same manner, and with the same precautions, as one blade of the forceps. Dr. Ramsbotham says, 'we shall find it necessary to apply it to different parts of the cranium, and perhaps the face also, successively, in order to relieve the head from its fixed condition, and favour its descent.' Such an operation obviously requires quite as much dexterity as the forceps; while, if we bear in mind its comparatively slight effect, and the possible risk of injury to the maternal structures, we must admit that the disuse of the instrument in modern practice is amply justified.

Fig. 154.



VECTIS WITH HINGED HANDLE.

Is sometimes of value in correcting malpositions of the head.

The vectis may, however, find a useful application when employed to rectify malpositions, especially in certain cases of difficult occipito-posterior presentations. This action of the instrument has already been considered (vol. i. p. 377), and, under such circumstances, it may prove of service where the forceps is inapplicable. When so employed it is passed carefully over the occiput, and, while the maternal structures are guarded from injury, downward traction is made during the continuance of a pain. So fixed, its application is perfectly simple and free from danger, and for this purpose it may be retained as a part of the obstetric armamentarium.

The fillet.

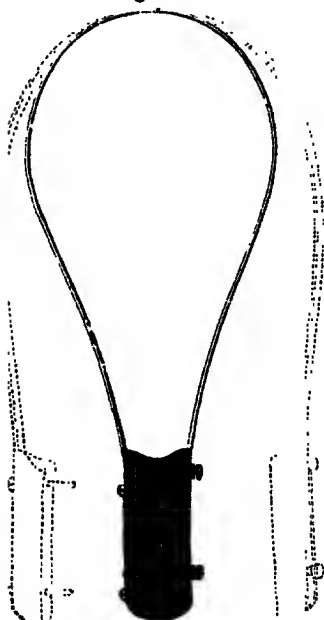
The *fillet* is the oldest of obstetric instruments, having been frequently employed before the invention of the forceps, and even in the time of Smellie it was much used in the metropolis. It has since completely fallen out of favour as a scientific instrument, although its use is every now and again advocated, and it is certainly a favourite instrument with some practitioners. This is to be explained by the apparent simplicity of the operation, and the fact that it can generally be performed without the knowledge of the patient, the

latter, however, being one strong reason why it should not be used.

The fillet consists, in its most improved form (that which is recommended by Dr. Eardley Wilmot¹ (fig. 155), of a slip of whalebone fixed into a handle, composed of two separate halves, which join into one. The whalebone loop is slipped over either the occiput or face; and used as a tractor.

Nature of the instrument.

Fig. 155.



WILMOT'S FILLET.

When applied over the face, after the head has rotated, it would probably do no harm; but if it were so placed when the head was high in the pelvis, traction would necessarily produce extension of the chin before the proper time, and would then interfere with the natural mechanism of delivery. If placed over the occiput, it would be impossible to make traction in the direction of the pelvic axes, as the instrument would then infallibly slip. If traction be made in any other direction, there must be a

Objections to its use.

risk of injuring the maternal structures, or of changing the position of the head. Hence, there is every reason for regarding the fillet as a tractor, or as a substitute for the forceps, even in the simplest cases.

It is quite possible that it may find a useful application in certain cases in which the vectis may also be used, viz., as a rectifier of malposition, and, from the comparative facility of its introduction, it would probably be the preferable instrument of the two.

Its use in certain malpositions of the head.

¹ *Obst. Trans.* vol. xv.

CHAPTER V.

OPERATIONS INVOLVING DESTRUCTION OF THE FŒTUS.

Operations involving the destruction of the fœtus are of great antiquity.

OPERATIONS involving the destruction and mutilation of the child were among the first practised in midwifery. Craniotomy was evidently known in the time of Hippocrates, as he mentions a mode of extracting the head by means of hooks. Celsus describes a similar operation, and was acquainted with the manner of extracting a fœtus in transverse presentations by decapitation; similar procedures were also practised and described by Aetius and others among the ancient writers. The physicians of the Arabian school not only employed perforators for opening the head, but were acquainted with instruments for compressing and extracting it.

Religious objections to craniotomy.

Until the end of the seventeenth century this class of operation was not considered justifiable in the case of living children; it then came to be discussed whether the life of the child might not be sacrificed to save that of the mother. It was authoritatively ruled by the Theological Faculty of Paris, that the destruction of the child in any case was mortal sin. 'Si l'on ne peut tirer l'enfant sans le tuer, on ne peut sans péché mortel le tirer.' This dictum of the Roman Church had great influence on Continental midwifery, more especially in France, where, up to a recent date, the leading obstetricians considered craniotomy to be only justifiable when the death of the fœtus had been positively ascertained. Even at the present day there are not wanting practitioners who, in their praiseworthy objection to the destruction of a living child, counsel delay until the child has died; a practice thoroughly illogical, and only sparing the operator's feelings at the cost of greatly increased risk to the mother. In England, the safety of the child has always been considered subservient to that of the mother; and it has been admitted that, in every case in which the extraction of a living fœtus by any of the ordinary means is impossible, its mutilation is perfectly justifiable.

It must be admitted, however, that the frequency with which craniotomy has been performed in this country constitutes a great blot on British midwifery. During the mastership of Dr. Labbat, at the Rotunda Hospital, the forceps were never once applied in 21,867 labours. Even in the time of Clarke and Collins, when the frequency of craniotomy was much diminished, it was performed three or four times as often as forceps delivery. These figures indicate a destruction of foetal life which we cannot look back to without a shudder, and which, it is to be feared, justify the reproaches which our continental brethren have cast upon our practice. Fortunately, professional opinion has now completely recognised the sacred duty of saving the infant's life, whenever it is practicable to do so; and it may justly be said that British obstetricians now teach, as carefully as those of any other nation, the imperative necessity of using every endeavour to avoid the destruction of the foetus.

Craniotomy was formerly performed in Great Britain with unjustifiable frequency.

The operation now under consideration may be necessary : 1st, when the head requires either to be simply perforated, or afterwards more completely broken up and extracted; an operation which has received various names, but is generally known in this country as *craniotomy*, and which may or may not require to be followed by farther diminution of the trunk. 2ndly, when the arm presents, and turning is impossible; this necessitates one of two procedures, *decapitation* with the separate extraction of the body and head, or *evisceration*. In both classes of case similar instruments are employed, and those generally in use at the present time may be first briefly described.

Division of the subject.

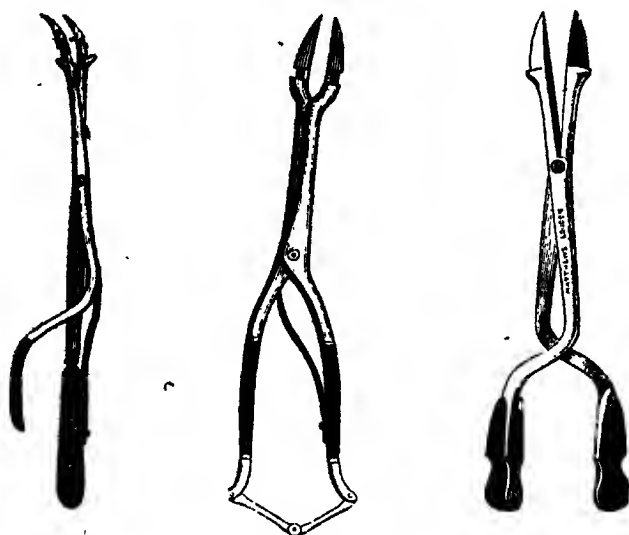
1. The object of the *perforator* is to pierce the skull of the child, so as to admit of the brain being broken up, and the consequent collapse and diminution in size of the cranium. The perforator invented by Denman, or some modification of it, has been principally employed. It requires the handles to be separated in order to open the blades, and this cannot be done by the operator himself. This difficulty is overcome in the modification of Naegelé's perforator used in Edinburgh, in which the handles are so constructed that they open the points when pressed together, and are separated by a steel rod, with a joint at its centre, to prevent their opening too soon. By this arrangement the instrument

Description of instruments employed.

Perforator.

can be manipulated by one hand only. The sharp-pointed portion has an external cutting edge, with projecting shoulders at its base, to prevent its penetrating too far into the cranium. Many modifications of these arrangements have since been contrived (figs. 156, 157, 158). In some parts of the Continent and America a perforator is used constructed on the principle of the trephine; but this is vastly more difficult to work, and has the great disadvantage of simply boring a hole in the skull, instead of splitting it up, as is done by the sharp-pointed instrument.

Figs. 56, 157, 158.



VARIOUS FORMS OF PERFORATORS.

The instruments for extraction are the *crotchet* and *craniotomy forceps*.

Crotchets
and craniotomy
forceps. *

The crotchet is a sharp-pointed hook of highly-tempered steel, which is fixed on some portion of the skull, either internal or external, traction being made by the handle. The shank of the instrument is either straight or curved (figs. 159 and 160), the latter being preferable, and it is either attached to a wooden handle or forged in a single piece of metal. A modification of this instrument is known as Oldham's vertebral hook. It consists of a slender hook, measuring, with its handle, 13 inches in length, which is passed through the foramen magnum, and fixed in the vertebral canal, so as to secure a firm hold for traction. All forms.

of crotchets are open to the serious objection of being liable to slip, or break through the bone to which they are fixed,

Objections to crotchets.

Figs. 159 & 160.



CROTCHETS.

so wounding either the soft parts of the mother, or the fingers of the operator placed as a guard. Hence they are dis-
countenanced by most recent writers, and may with propriety be regarded as obsolete instruments.

Their place as tractors is well supplied by the more modern craniotomy forceps (fig. 161). These are intended to lay hold of the skull, one blade being introduced within the cranium; the other externally, and, when a firm grasp has been obtained, downward traction is made. A second object they fulfil is, to break away and remove portions of the skull, when perforation and traction alone are insufficient to effect delivery. Many forms of craniotomy forceps are in use, some armed with formidable teeth, others, of simpler construction, depending on their roughened and serrated internal surfaces for firmness of grasp. For general use, there is no better instrument

Craniotomy forceps are preferable for extraction.

than the so-called *cranioclast* of Sir James Simpson (fig. 162), which admirably fulfils both these indications. It consists of two separate blades, fastened by a button joint. The extremities of the blades are of a duck-billed shape, and are sufficiently curved to allow of a firm grasp of the skull being taken; the upper blade is deeply grooved to allow the lower to sink into it, and this gives the instrument great power in fracturing the cranial bones, when that is found to be necessary. It need not, however, be employed for the latter purpose, and, the blades being serrated on their under surface, form as perfect a pair of craniotomy forceps as any in ordinary use. Provided with it, we are spared the necessity of procuring a number of instruments for extraction.

Simpson's cranioclast.

Amongst modern improvements in midwifery there are few which have led to more discussion than the use of the *cephalotribe*. This instrument, originally invented by Bau-

Cephalotribe.

delocque, was long employed on the Continent before it was used in this country, the prejudice against it being no doubt due to its formidable size and appearance. Of late years many of our leading obstetricians have used it in preference either to the crotchet or craniotomy forceps, and have materially modified and improved its construction, so that the most objectionable features of the older instruments are now entirely removed.

Object of
the instru-
ment.

The cephalotribe consists of two powerful solid blades, which are applied to the head after perforation, and ap-

Fig. 161.



CRANIOTOMY FORCEPS.

Fig. 162.



SIMPSON'S CRANIOCLAST.

Its pecu-
liar advan-
tages.

proximated by means of a screw so as to crush the cranial bones, and after this it may be also used for extraction. The peculiar value of the instrument is, that, when properly applied, it crushes the firm basis of the skull, which is left untouched by craniotomy, or, if it do not, it at least causes the base to turn edgeways within the blades, so as to place it in a more favourable position for extraction. Another and specially valuable property is, that it crushes the bones *within* the scalp, which forms a most efficient protective covering to their sharp edges; in this way one of the principal dangers of craniotomy, the wounding of the maternal passages by spiculæ of bone, is entirely avoided.

The cephalotribe, therefore, acts in two ways; as a crusher,

and as a tractor. Some obstetricians believe the former to be its more important use, and even maintain that the cephalotribe is unsuited for traction. This view is specially maintained by Pajot, who teaches that, after the size of the skull has been diminished by repeated crushings, its expulsion should be left to the natural powers. There are some grounds for believing that in the greater degrees of obstruction the tractive power of the instrument is unsuited for use; but, in the large majority of cases, the facility with which the crushed head may be withdrawn by it constitutes one of its chief claims to the attention of the obstetrician. No one who has used it in this way, and experienced the rapid and easy manner in which it accomplishes delivery, can have any doubt on this point.

Some obstetricians object to using it as a tractor.

There is every reason to believe that cephalotripsy will be much extended in this country, and that it will be considered, as I believe it unquestionably deserves to be, the ordinary operation in cases requiring destruction of the fœtus. The comparative merits of cephalotripsy and craniotomy will be subsequently considered.

Its value.

The most perfect cephalotribe is probably that known as Braxton Hicks's (fig. 163), which is a modification of Simpson's. It is not of unwieldy size, but sufficiently powerful for any case, and not extravagant in price. The blades have a slight pelvic curve, which materially facilitates their introduction, yet not sufficiently marked to interfere with their being slightly rotated after application. Dr. Kidd, of Dublin, prefers a perfectly straight blade; while Dr. Matthews Duncan thinks it better to use a somewhat bulkier instrument, modelled on the type of the Continental cephalotribes. The principle of action of all these is identical, and their differences are really not of very material importance.

Description of the instrument.

Another mode of diminishing the fœtal skull is by removing it in sections. This is the principle embodied in the forceps-saw of Van Huevel, which consists of two large blades, not unlike those of the cephalotribe in appearance. Within these there is a complicated mechanism, working a chain saw from below upwards, which cuts through the fœtal skull; the separated portions are subsequently withdrawn piecemeal. This instrument is very highly spoken of by the Belgian ob-

Section of the skull by the forceps-saw, or écran-seur.

stetricians who have used it, and who believe that it affords by far the safest and most effectual way of reducing the bulk of the foetal skull. In this country it is practically unknown; and, although it must be admitted to be theoretically excellent, the exceeding complexity and cost of the apparatus have always stood in the way of its being used.

Dr. Barnes has suggested that the same object may be obtained by dividing the head with a strong wire écraseur. So far as I know, this suggestion has never yet been carried out in practice, not even by himself, and therefore it is not possible to say much about it. I should imagine, however, that there would be considerable difficulty in satisfactorily passing the loop of wire over the skull, in a pelvis in which there is any well-marked deformity.

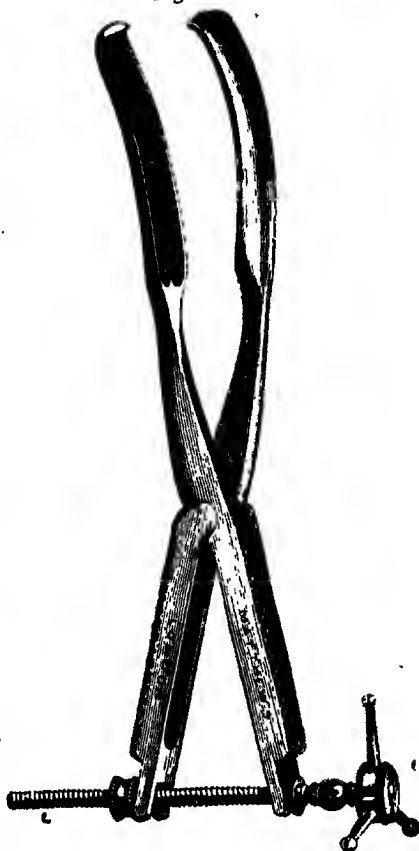
Cases requiring
craniotomy.

The most common case for which craniotomy or cephalotripsy is performed, is a want of proper proportion between the head and the maternal passages. This may arise from a variety of causes. The most important, and that most

Deformity
of the
pelvis.

often necessitating the operation, is osseous deformity. This may exist either in the brim, cavity, or outlet, and it is most often met with in the antero-posterior diameter of the brim. Obstetric authorities differ considerably as to the precise amount of contraction which will prevent the passage of a living child at term. Thus Clarke and Burns believe that a living child cannot pass through a pelvis in which the antero-posterior diameter at the brim is less than $3\frac{1}{2}$ inches. Ramsbotham fixes the limit at 3 inches, and Osborne and

Fig. 163.



HICKS'S CEPHALOTRIBE.

Hamilton at $2\frac{3}{4}$ inches. The latter is the very extreme limit at which the birth of a living child is possible; but there can be no doubt that, under favourable circumstances, it may be possible to draw the fœtus, after turning, through a pelvis of that size. The opposite limit of the operation is still more open to discussion. Various authorities have considered it quite possible to draw a mutilated fœtus through a pelvis in which the antero-posterior diameter does not exceed $1\frac{1}{2}$ inches, and, indeed, have succeeded in doing so. But then there must be a fair amount of space in the transverse diameter of the pelvis to admit of the necessary manipulations. If there be a clear space here of 3 inches and upwards, it is no doubt possible to deliver *per vias naturales*; but, in such extreme deformities, the difficulties of the operation are so great, and the bruising of the maternal structures so extensive, that it becomes an operation of the greatest possible severity, with results nearly as unfavourable to the mother as the Cæsarean section. Hence some Continental authorities have not scrupled to prefer the latter operation in the worst class of pelvic deformity. The rule in English practice always has been that craniotomy must be performed whenever it is practicable; and there can be no doubt that it is the right one.

Dangers of the operation in cases of extreme pelvic deformity.

Between from $2\frac{3}{4}$ to 3 inches antero-posterior diameter in the one direction, and $1\frac{1}{2}$ inches in the other, may be said to be the limits of craniotomy, provided, in the latter case, there be a fair amount of space in the transverse diameter. The same limits may be laid down with regard to tumours or other sources of obstruction.

Limits of the operation.

There are a few other conditions in which craniotomy is justifiable, independently of pelvic contraction, such as certain conditions of the soft parts which are supposed to render the passage of the head peculiarly dangerous to the mother. Among them may be mentioned swelling and inflammation of the vagina from the length of the previous labour, the presence of bands and cicatrices in the vagina, and occlusion and rigidity of the os. It is hardly too much to say that with a proper use of the resources of midwifery, the destruction of a living fœtus for any of these conditions might be obviated. The most common of them is undoubtedly swelling of the soft parts causing impaction of the head; an

Other causes justifying craniotomy

In most of these cases the destruction of the fœtus can be obviated.

occurrence which ought to be invariably prevented by a timely use of the forceps. Should interference unfortunately be delayed until impaction has actually taken place, doubtless no other resource but craniotomy would be left; but such cases, it is to be hoped, are now of rare occurrence in British practice. Undue rigidity of the os can be overcome by dilatation with the caoutchouc bags, or, in more serious cases, by incision, which would certainly be less perilous to the mother than dragging even a mutilated foetus through the small and rigid aperture. In the case of bands and cicatrices in the vagina, dilatation or incision will generally suffice to remove the obstruction; but even were this not so, here, as in excessive rigidity of the perinæum, it would be better that slight lacerations should take place, than that the child should be killed.

Certain complications of labour are held to justify craniotomy.

Certain complications of labour are held to justify craniotomy, such as rupture of the uterus, convulsions, and hæmorrhage. The application of the forceps or turning will generally answer our purpose equally well, especially as we have the means of dilating the os sufficiently to admit of one or other of them being performed, when the natural dilatation is not sufficient. Craniotomy in rupture of the uterus will also be rarely indicated, as we have seen that gastrotomy appears to afford a better chance to the mother in those cases in which the foetus has partially or entirely escaped from the uterine cavity.

Excessive size of the foetus may require the operation.

Want of proportion between the foetus and the pelvis, depending on undue size of the head, either natural, or the result of disease, may render the operation essential. In the former of these cases we shall generally have first attempted delivery with the forceps, and, if they have failed, there can be no doubt as to the propriety of at once lessening the bulk of the head by perforation.

Craniotomy when the child is believed to be dead.

In most obstetric works we are recommended to perforate, rather than apply the forceps, when we are convinced that the child has ceased to live. This advice is based on the greater facility with which craniotomy can be performed, and its supposed greater safety to the mother. There can be no doubt of the ease with which the child can be extracted after perforation, when the pelvis is not contracted; and, if we could always be sure of our diagnosis, the rule

might be a good one. Before acting on it, however, we must bear in mind the extreme difficulty of positively ascertaining the death of the fœtus. Of the signs usually relied on for this purpose, there are scarcely any which are not open to fallacy, except peeling of the scalp, and disintegration of the cranial bones (which do not take place unless the child has been dead for a length of time), and they are, therefore, useless in most instances. Discharge of the meconium constantly takes place when the child is alive; a cold and pulseless prolapsed cord may belong to a twin; and the fœtal heart may become temporarily inaudible, although the child is not dead. If, indeed, we have carefully watched the fœtal heart all through the labour, and heard it become more and more feeble, until at last it has stopped altogether, we might be certain that the child had died; but surely such observations would indicate an early recourse to the forceps or version, so as to obviate the fatal result we know to be impending.

Difficulty of determining the death of the fœtus.

In certain breech presentations, or after turning, it may be found impossible to extract the head, without diminishing its size by perforating behind the ear. In such cases we know to a certainty whether the child be alive or dead, before resorting to the operation.

Perforation of the after-coming head.

The first step, whether we resort to cephalotripsy or craniotomy, is perforation, which may, therefore, be first described. In the former the necessity of first perforating the head is not always recognised. To endeavour to crush the head without perforating is needlessly to increase the difficulties of the case, and it should be remembered, as a cardinal rule, that perforation is an essential preliminary to the proper use of the cephalotribe.

Perforation is an essential preliminary both in craniotomy and cephalotripsy.

When we desire to perforate we must carefully ascertain the exact relation of the os to the presenting part, since, in many cases, the operation is performed before the os is fully dilated, and it is most essential to avoid all risk of wounding it. Two or more fingers of the left hand should be passed up to the head, and placed against the most prominent part of the parietal bone. Under these, used as a guard (fig. 164), the perforator should be cautiously introduced until the scalp is reached. It is important to fix on a bony part of the skull, and not on a suture or fontanelle, for puncture, because our

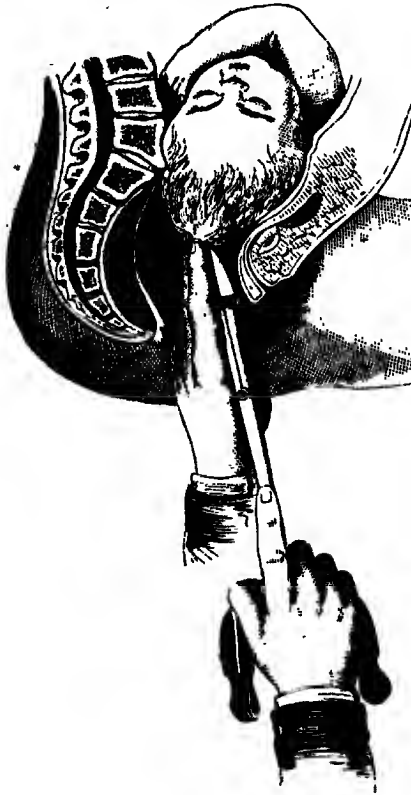
Introduction of the instrument.

Method of perforation.

Penetration of the skull.

object is to break up the vault of the cranium as much as possible, so as to allow the skull to collapse. When the instrument has reached the point we have selected, it should be made to penetrate the scalp and skull with a semi-rotatory boring motion, and advanced until it has sunk up to the rests, which will oppose its further progress. Occasionally considerable force will be necessary to effect penetration, more

Fig. 164.



PERFORATION OF THE SKULL.

especially if the scalp be swollen by long continued pressure; and this stage of the operation will be facilitated by causing the assistant to steady the head by pressure through the abdomen, more especially if it be still free above the pelvic brim. We must then press together the handles of the instrument, which will have the effect of widely separating the cutting portion, and making an incision through the bones. After this the point should be turned round, and again opened at right angles to the former incision, so as to make

a free crucial opening. During this process care must be taken to bury the perforator in the skull up to the rests, so as to avoid the possibility of injuring the maternal soft parts. The instrument should now be introduced within the skull and moved freely about, so as to thoroughly and completely destroy the brain. Especial care must be taken to reach the medulla oblongata and base of the brain, for, if these were not destroyed, we might subject ourselves to the distress of extracting a child in whom life was not extinct. If this part of the operation be thoroughly performed, there will be no necessity for washing out the brain by the injection of warm water, as is sometimes recommended, for the broken-up tissue will escape freely through the opening made by the perforator.

Breaking-up of the brain.

The perforation of the after-coming head does not generally offer any particular difficulty. It is accomplished in the same manner, the child's body being well drawn out of the way by an assistant. The point of the perforator, carefully guarded by the finger, is guided up to the occiput, or behind the ear, where it is inserted.

Perforation of the after-coming head.

If there be no necessity for very rapid delivery, and the pains be still present, it is often advisable to wait ten minutes or a quarter of an hour before proceeding to extract. This delay will allow the skull to collapse and become moulded to the cavity of the pelvis, when forced down by the pains, and possibly the natural efforts may suffice to finish the labour in that time; or, at least, the head will have descended further, and will be in a better position for extraction. Should perforation be required after having failed to deliver with the forceps—and this is only likely to be the case when the obstruction is comparatively slight—it is certainly a good plan to perforate without removing the forceps, which may then be used as tractors.

It is sometimes useful to postpone extraction.

We have now to decide on the method of extraction, and our choice lies between the cephalotribe and the craniotomy forceps.

Those who have used both must, I think, admit that in any ordinary case, in which the obstruction is not great, and only a comparatively slight diminution in the size of the head is required, cephalotripsy is infinitely the easier operation. The facility with which the skull can be crushed, and extracted after crushing, is sometimes remarkable, and

In some cases perforation may be performed without removing the forceps previously employed.

Extraction of the head.

Comparative merits of cephalotripsy and craniotomy.

Where the obstruction is not great, cephalotripsy is the simpler and safer operation of the two.

those who will take the trouble to read the reports of the operation published by Braxton Hicks, Kidd, and others, cannot fail to be struck with the rapidity with which the broken down head may often be extracted. This is far from being the case with extraction by the craniotomy forceps, even when the obstruction is moderate only; for it may be necessary to use considerable traction, or the blades may take a proper grasp with difficulty, or it may be essential to break down and remove a considerable portion of the vault of the cranium before the head is lessened sufficiently to pass. During the latter process, however carefully performed, there is a certain risk of injuring the maternal structures, and, in the hands of a nervous or inexperienced operator, this danger, which is entirely avoided in cephalotripsy, is far from slight. The passage of the blades of the cephalotribe is by no means difficult, and I think it must be admitted that the possible risks attending it are comparatively small. On account, therefore, of its simplicity and safety to the maternal structures, I believe cephalotripsy to be decidedly the preferable operation in all cases of moderate obstruction.

Where the obstruction is considerable cephalotripsy does not offer the same advantages.

When we approach the lower limit, and have to do with a very marked amount of pelvic deformity, the two operations stand on a more equal footing. Then the deformity may be so great as to render it difficult to pass the blades of even the smallest cephalotribe sufficiently deep to grasp the head firmly, and, even when they are passed, the space is often so limited as to impede the easy working of the instrument. Besides this, repeated crushings may be required to diminish the skull sufficiently. I attach but little importance to the argument that the diminution of the skull in one diameter increases its bulk in another. The necessity of removing and replacing the blades on another part of the skull, and repeating this perhaps several times, in the manner recommended by Pajot, is a far more serious objection. To do this in a contracted pelvis involves, of necessity, the risk of much contusion. Fortunately cases of this kind are of extreme rarity, much more so than is generally believed, and when they do occur they tax the resources of the practitioner to the utmost.

On the whole, the conclusion I would be inclined to arrive at with regard to the two operations is, that in all

ordinary cases, cephalotripsy is safer and easier, whereas in cases with considerable pelvic deformity, the advantages of cephalotripsy are not so well marked, and craniotomy may even prove to be preferable.

The first step in using the cephalotribe is the passage of the blades. These are to be inserted in precisely the same manner, and with the same precautions, as in the high forceps operation. In many cases the os is not fully dilated, and it is absolutely essential to pass the instrument within it. Special care should, therefore, be taken to avoid any injury to its edges, and, for this purpose, two or three fingers of the left hand, or even the whole hand, should be passed high up, so as thoroughly to protect the maternal structures. In order that the base of the skull may be reached and effectually crushed, the blades must be deeply inserted, and, in doing this, great care and gentleness must be used; as the projecting promontory of the sacrum generally tilts the head forwards, the handles of the instrument, after locking, must be well pressed back towards the perinæum. If the blades do not lock easily, or if any obstruction to their passage be experienced, one of them must be withdrawn and re-introduced, just as in forceps operations. Care must be taken to fix and steady the head by abdominal pressure as the instrument is being inserted, since it is generally far above the brim, and would readily recede if this precaution were neglected. When the blades are *in situ*, we proceed to crush by turning the screw slowly, and, as the blades are approximated, the bones yield, and the cephalotribe sinks into the cranium. The crushed portion then measures, of course, no more than the thickness of the blades, that is about $1\frac{1}{2}$ inches. This is necessarily accompanied by some bulging of the part of the cranium that is not within the grasp of the instrument (fig. 165), but in slight contractions this is of no consequence, and we may proceed to extraction, waiting, if possible, for a pain, and drawing downwards in the axis of the pelvic outlet, as in forceps delivery. The site of perforation should be examined to see that no spiculæ of bone are projecting from it, and if so they should be carefully removed. In such cases the head often descends at once, and with the greatest ease. Should it not do so, or should the obstruction be consider-

Description of the operation; introduction of the blades.

Care must be taken to fix the head by abdominal pressure.

Extraction after crushing.

It is sometimes advisable to rotate the head before extraction.

A second introduction of the blades and subsequent crushing is sometimes required.

able, a quarter turn should be given to the handles of the instrument, so as to bring the crushed portion into the narrowed diameter, and the uncrushed portion into the wider transverse diameter. It may now be advisable to remove the blades carefully, and to reintroduce them with the same precautions, so as to crush the unbroken portion of the skull. This adds materially to the difficulties of the case, since the blades have a tendency to fall into the deep channel already made in the cranium, and so it is by no means always easy to seize the skull in a new direction. Before re-applying them, if the condition of the patient be good and pains be present, it may be well to wait an hour or more, in the hope of the head being moulded and pushed down into the pelvic cavity. This was the plan adopted by Dubois, and, according to Tarnier, was the secret of his great success in the operation. Pajot's method of repeated crushings, in the greater degrees of contraction, is based on the same idea, and he recommends that the instrument should be reintroduced at intervals of two, three, or four hours, according to the state of the patient, until the head is thoroughly crushed; no attempts at traction being used, and expulsion being left to the natural powers. This, he says, should always be done when the contraction is below $2\frac{1}{2}$ inches, and he maintains that it is quite possible to effect delivery by this means when there is only $1\frac{1}{2}$ inches in the antero-posterior diameter. The repeated introduction of the blades in this fashion must necessarily be hazardous, except in the hands of a very skilful operator; and I believe that, if a second application fail to overcome the difficulty, which will only be very exceptionally the case,

Fig. 165.

FETAL HEAD CRUSHED BY THE
CEPHALOTRIBE.

Pajot's
plan of
repeated
crushings.

that it would be better to resort to the measures presently to be described.

Should we elect to trust to the craniotomy forceps for extraction, one blade is to be introduced through the perforation, and the other, in apposition to it, on the outside of the scalp. In moderate deformities, traction applied during the pains may of itself suffice to bring down the head. Should the obstruction be too great to admit of this, it is necessary to break down and remove the vault of the cranium. For this purpose Simpson's cranioclast answers better than any other instrument. One of the blades is passed within the cranium, the other, if possible, between the scalp and the skull, and the portion of bone grasped between them is then broken off, which can generally be accomplished by a twisting motion of the wrist, without using much force. The separated portion of bone is then extracted, the greatest care being taken to guard the maternal structures, during its removal, by the fingers of the left hand. The instrument is then applied to a fresh part of the skull and the same process repeated, until as much of the vault of the cranium as may be deemed necessary is broken up and removed.

Extraction by the craniotomy forceps.

Breaking down and removal of the cranial vault.

Dr. Braxton Hicks, in a well-known paper on the best mode of extracting the head after perforation,¹ has conclusively shown that in difficult cases, after the removal of the cranial vault, the proper procedure is to bring down the face; since the smallest measurement of the skull, after the removal of the upper part of the cranium, is from the orbital ridge to the alveolar edge of the superior maxillary bone. This alteration in the presentation he proposes to effect by a small blunt hook, made for the purpose, which is forced into the orbit, by means of which the face is made to descend. Barnes recommends that this should be done by fixing the craniotomy forceps over the forehead and face, and making traction in a backward direction so as to get the face past the projecting promontory of the sacrum. The importance of bringing down the face was long ago pointed out by Hall and Burns, but it had been lost sight of, until Hicks again drew attention to it in the paper referred to. In the class of cases in which this procedure is valuable, the risk to the maternal

Advantages of bringing down the face in difficult cases.

¹ *Obst. Trans.* v. vii.

Importance of preserving the scalp.

passages, from the removal of fractured portions of bone, must always be considerable, and it is of great importance not only to preserve the scalp as entire as possible, so as to protect them, but to use the utmost possible care in removing the broken pieces of bone.

Extraction of the body.

When the extraction of the head has been effected, either by the cephalotribe or the craniotomy forceps, there is seldom much difficulty with the body. By traction on the head one of the axillæ can easily be brought within reach, and if the body do not readily pass, the blunt hook should be introduced, and traction made until the shoulder is delivered. The same can then be done with the other arm. If there be still difficulty, the cephalotribe may be used to crush the thorax. The body is, however, so compressible that this is rarely required.

Embryotomy in transverse presentations in which turning is impossible.

There only remains for us to consider the second class of destructive operations. These may be necessary in long neglected cases of arm presentation, in which turning is found to be impracticable. Here fortunately the question of killing the fœtus does not arise, since the child will, almost necessarily, have already perished from the continuous pressure. We have two operations to select from, *decapitation* and *evisceration*.

Decapitation.

The former of these is an operation of great antiquity, having been fully described by Celsus. It consists in severing the neck, so as to separate the head from the body; the body is then withdrawn by means of the protruded arm, leaving the head in utero to be subsequently dealt with. If the neck can be reached without great difficulty—and, in the majority of cases, the shoulder is sufficiently pressed down into the pelvis to render this quite possible—there can be no doubt, that it is much the simpler and safer operation.

Methods of dividing the neck.

The whole question rests on the possibility of dividing the neck. For this purpose many instruments have been invented. The one generally recommended in this country is known as Ramsbotham's hook, and consists of a sharply curved hook, with an internal cutting edge. This is guided over the neck, which is divided by a sawing motion. There is often considerable difficulty in placing the instrument over the neck, although, if this were done, it

would doubtless answer well. Others have invented instruments, based on the principle of the apparatus for plugging the nostrils, by means of which a spring is passed round the neck, and to the extremity of the spring a short cord, or the chain of an *écraseur*, is attached; the spring is then withdrawn and brings the chain or cord into position. The objection to any of these apparatuses is, that they are unlikely to be at hand when required, for few practitioners provide themselves with costly instruments, which they may never require. It is of importance, therefore, that we should have at our command some means of dividing the neck, which is available in the absence of any of these contrivances. Dubois recommends for this purpose a strong pair of blunt scissors. The neck is brought as low as possible by traction on the prolapsed arm, and the blades of the scissors guided carefully up to it. By a series of cautious snipping movements it is then completely divided from below upwards. This, if the neck be readily within reach, can generally be effected without any particular difficulty. Dr. Kidd, of Dublin,¹ who strongly advocates this operation, recommends that an ordinary male elastic catheter, strongly curved and mounted on a firm stilet, or, still better, on a uterine sound, should be passed round the neck. Previous to introduction a cord should be attached to the extremity of the catheter, which is left round the neck when it is withdrawn. By means of this cord a strong piece of whiplcord, or the wire of an *écraseur*, can easily be drawn round the neck and used for dividing it. The former, to protect the maternal structures, may be worked through a speculum, and by a series of lateral movements the neck is easily severed. The *écraseur*, however, offers special advantages, since it entirely does away with any risk of injuring the mother.

After the neck is divided the remainder of the operation is easy. The body is withdrawn without difficulty by the arm, and we then proceed to deliver the head. By abdominal pressure this, in most cases, can be pushed down into the pelvis, so as to come easily within reach of the cephalotribe, which is by far the best instrument for extraction. Preliminary perforation is not necessary, since the brain can escape through the severed vertebral canal. The

With-
drawal of
the body,
and de-
livery of
the head.

¹ *Dublin Quart. Journ.* May 1871.

secret of doing this easily is to fix and press down the head sufficiently from above, otherwise it would slip away from the grasp of the instrument. The perforator and craniotomy forceps may be used, if the cephalotribe be not at hand. Perforation is, however, by no means always easy, on account of the mobility of the head. After it is accomplished one blade of the craniotomy forceps is passed within the skull, the other externally, and the head slowly drawn down.

Eviscera-
tion.

The alternative operation of evisceration is a much more troublesome and tedious procedure, and should only be used when the neck is inaccessible. The first step is to perforate the thorax at its most depending part, and make as wide an opening into it as possible, in order to gain access to its contents. Through this the thoracic viscera are removed piecemeal, being first broken up as much as possible by the perforator, and then, the diaphragm being penetrated, those in the abdomen. The object is to allow the body to collapse, and the pelvic extremities to descend, as in spontaneous evolution. This can be much facilitated by dividing the spinal column with a strong pair of scissors, introduced into the opening made in the thorax. Thus the body is doubled up as on a hinge, and its expulsion greatly facilitated. Here the crotchet may find a useful application, for it can be passed through the abdominal cavity, and fixed on some point in the interior of the child's pelvis; and thus strong traction can be made without any risk of injury to the mother. It can be readily understood that this process is so lengthy and difficult as to render it probably the most trying of obstetric operations; it is certainly inferior in every respect to decapitation, and is only to be resorted to when that is impracticable.

Decapita-
tion when
practicable
is the pre-
ferable
operation.

CHAPTER VI.

THE CÆSAREAN SECTION—SYMPHYSEOTOMY—AND
GASTRO-ELYTROTOMY.

THE Cæsarean section has perhaps given rise to more discussion than any other subject connected with midwifery, and there is yet much difference of opinion as to the limits of, and indications for, the operation. The period at which the Cæsarean section was first resorted to is not known with accuracy. It seems to have been practised by the Greeks, after the death of the mother; and Pliny mentions that Scipio Africanus and Manlius were born in this way. The name of Cæsar is said to have been given to children so extracted, and afterwards to have been assumed as a family patronymic. These children were dedicated to Apollo; whence arose the practice of things sacred to that god being taken under the special protection of the family of the Cæsars. Many celebrities have been supposed to owe their lives to the operation; among the rest Æsculapius, Julius Cæsar, and our own Edward VI. Regarding the two latter, there is conclusive proof that the tradition is without foundation. There is no doubt that the operation was constantly practised on women who had died at an advanced period of pregnancy, and indeed it has, at various times, been enforced by law. Thus among the Romans it was decreed by Numa, that no pregnant woman should be buried until the foetus had been removed by abdominal section. The Italian laws also made it necessary, and the operation has always received the strong support of the Roman Church. So lately as the middle of the eighteenth century, the King of Sicily sentenced to death a physician who had neglected to practise it. The first authentic case in which the operation was performed on a living woman occurred in 1491. It was afterwards practised by Nufer in 1500; and in 1581 Rousset published a

History of
the Cæsarean
section.

Was often
enforced
by law
after the
death of
the mother.

work on the subject, in which a number of successful cases were related. In English works of that time it is not alluded to, although it was undoubtedly performed on the Continent, and to such an extent that its abuse became almost proverbial. We have evidence in Shakespeare, however, that the operation was familiarly known in this country, since he tells us that—

. Macduff was from his mother's womb
Untimely ripped.

Paré and Guillemeau, amongst the writers of the period, were noted for their hostility to the operation; while others equally strongly upheld it.

In this country the Cæsa-rean section has almost always been performed under the most unfavourable conditions.

It has also been done without proper care and attention to details.

The mortality attending it is therefore not surprising.

In this country it has scarcely ever been performed in a manner which offers even the faintest hope of success. It has been looked upon as almost necessarily fatal to the mother, and it has, therefore, been delayed until the patient has arrived at the utmost stage of exhaustion. For example, in looking over the records of British cases, it is no uncommon thing to find that Cæsa-rean section was resorted to, two, three, or even six days after labour had begun,¹ and when the patient was almost moribund. With rare exceptions within the last few years, the operation has been performed in what may be called a hap-hazard way. In many cases long and fruitless attempts at delivery by craniotomy had already been made, so that the passages had been subjected to much contusion and violence. Little or no attempt has been made to obviate the well-known risks of abdominal operations; no care has been taken to prevent blood and other fluids finding their way into the peritoneal cavity, and no means have been adopted subsequently to remove them. It is, therefore, not so much a matter of surprise that the mortality should have been so great, but rather that any cases at all should have recovered.

From what we know of the history of ovariectomy, its early fatality, and the extreme and even apparently exaggerated precautions which are essential to its success, it is fair to conclude that, if the Cæsa-rean section were performed, as it is to be hoped it always will be in future, with the same careful attention to minute details as ovariectomy, the results would not be altogether so deadly. Making every allowance for

¹ See Radford on *Cæsa-rean Section*, p. 15.

these facts, it must be admitted that the Cæsarean section is necessarily almost a forlorn hope; and in making these observations I have no intention of contesting the well established rule of British practice, that it is not admissible as an operation of election, and must only be resorted to when delivery *per vias naturales* is clearly impossible.

The mortality, as given in statistical returns from various sources, differs so greatly as to make them but little reliable. Radford tabulates 77 operations performed in this country, of which 66, or 85·71 per cent. proved fatal, and 11, or 14·28 per cent. recovered. Michaelis and Kayser found that out of 258 and 338 operations, 54 and 64 per cent. respectively were fatal. These include operations performed under all sorts of conditions, even when the patient was almost moribund; and until we are in possession of a sufficient number of cases performed under conditions showing that the result is obviously due to the operation—in which it was undertaken at an early period of labour, and performed with a reasonable amount of care—it is obviously impossible to arrive at any reliable conclusions as to the mortality of the operation. That it is necessarily hopeless is certainly not the case, and we know that on the Continent, where it is resorted to much oftener and earlier in labour than in this country, there are authentic cases in which it has been performed twice, thrice, and even, in one instance, four times on the same patient. Kayser thinks that a second operation on the same patient affords a better prognosis than a first, probably because peritoneal adhesions, resulting from the first operation, have shut off the general abdominal cavity from the uterine wound; and he believes that in second operations the mortality is not more than 29 per cent.

Statistical returns are not reliable.

In some cases it has been successfully performed more than once on the same patient.

The mortality of the children likewise cannot be ascertained from statistical returns, since, in the large majority of cases in which dead children were extracted, the result had nothing to do with the operation. Indeed, there is nothing in the operation itself which can reasonably be supposed to affect the child. If, therefore, the child be alive when the operation is commenced, there is every probability of its being extracted alive; and Radford's conclusion that, 'the risk to infants in Cæsarean births is not much greater than that which is contingent on natural labour, provided

Results to the child.

correct principles of practice are adopted,' probably very nearly represents the truth.

Causes
requiring
the opera-
tion.

Of these
the most
common is
pelvic
deformity.

Tumours
obstruct-
ing the
pelvis or
morbid
conditions
of the
maternal
soft parts.

The Cæsarean section is required when there is such defective proportion between the child and the maternal passages, that even a mutilated foetus cannot be extracted. This in by far the greatest number of cases is due to deformity of the pelvis arising from rickets or mollities ossium. The latter may occur in a patient who has been previously healthy, and who has given birth to living children. It is a more common cause of the extreme varieties of deformity than rickets, and out of 77 British cases, tabulated by Radford, in 43 the deformity was produced by osteomalacia, and in 14 only by rickets. In certain cases the pelvis itself may be of normal size, but has its cavity obstructed by a solid tumour of the ovary, of the uterus itself, or one growing from the pelvic wall. The obstruction may also depend on morbid conditions of the maternal soft parts, of which the most common is advanced malignant disease of the cervix. Other conditions may, however, render it essential. Thus Dr. Newman¹ records a case in which he performed the operation for insurmountable resistance and obstruction of the cervix, which was believed at the time to be malignant. The patient recovered, and was subsequently delivered naturally, and without anything abnormal being made out. This renders it probable that the disease was not malignant, and it may possibly have been an extensive inflammatory exudation into the tissues of the cervix, subsequently absorbed. I myself was present at a Cæsarean section performed in Calcutta in the year 1857, when the pelvis was so uniformly blocked up with exudation, probably due to extensive pelvic cellulitis or hæmatocele, that the operation was absolutely essential.

Limits of
obstruction
justifying
the
operation.

Different accoucheurs have fixed on various limits for the operation. Most British authorities are of opinion that it need not be resorted to, if the smallest diameter of the pelvis exceed $1\frac{1}{2}$ inch. This question has already been considered in discussing craniotomy, and it has been shown that a mutilated foetus may be drawn through a pelvis of $1\frac{1}{2}$ inch antero-posterior diameter, provided there be a space of 3 inches and upwards in the transverse diameter. If sufficient

¹ *Obst. Trans.*, vol. viii. p. 343.

space for using the necessary instrument do not exist, the Cæsarean section may be absolutely required, even when there is a larger antero-posterior diameter than $1\frac{1}{2}$ inch. This is especially likely to occur when we have to do with deformity arising from mollities ossium, in which the obstruction is in the sides and outlet of the pelvis, the true conjugate being even sometimes elongated. On the Continent the Cæsarean section is constantly practised, as an operation of election, when the smallest diameter measures from 2 to $2\frac{1}{2}$ inches; and, when the child is positively known to be alive, some foreign authors recommend it when there are as much as 3 inches in the antero-posterior diameter. In this country, where the life of the child is most properly considered of secondary importance to the safety of the mother, we cannot fix one limit for the operation when the child is living, and another when it is dead. Nor, I think, can we admit the desire of the mother to run the risk, rather than sacrifice the child, as a justification of the operation, although this is laid down as an indication by Schröder.¹ Great as are the dangers attending craniotomy in extreme deformity, there can be no doubt that we must perform it whenever it is practicable, and only resort to the Cæsarean section when no other means of delivery are possible.

On the Continent the Cæsarean section is often performed in lesser degrees of deformity.

Cæsarean section not justifiable as an operation of election. Craniotomy must be performed whenever delivery by that means is possible.

For this reason I think it unnecessary to discuss the question, whether we are justified in destroying the fœtus in several successive pregnancies, when the mother knows that it is impossible for her to give birth to a living child. Denman was the first to question the advisability of repeating craniotomy on the same patient. Amongst modern authors Radford takes the most decided view on this point, and distinctly teaches that even when delivery by craniotomy is possible, it 'can be justified on no principle, and is only sanctioned by the dogma of the schools, or by usage,' and that, therefore, the Cæsarean section should be performed with the view of saving the child. Doubtless much can be said from this point of view; but, nevertheless, he would be a bold man who would deliberately elect to perform the Cæsarean section on such grounds. It is to be hoped, however, that in these days the induction of premature labour or abortion

¹ *Manual of Midwifery*, p. 202.

would always spare us the necessity of deciding so delicate a point.

Post-mortem
Cæsarean
section.

The Cæsarean section may also be required in cases in which death has occurred during pregnancy or labour. This was the indication for which it was first employed, and it has constantly been performed when a pregnant woman has died at an advanced period of utero-gestation. There is no doubt that a prompt extraction of the child under these circumstances has frequently been the means of saving its life, but by no means so often as is generally supposed. Thus Schwartz¹ showed that out of 107 cases in which it was employed not one living child was extracted. Villeneuve,² however, reports several successful cases, in 4 of which the operation was performed immediately after the mother's death, in 5 others at periods varying from ten minutes to half an hour.

Want of
success in
the post-mortem
operation.

The reason that the want of success has been so great, is doubtless the delay that must necessarily occur before the operation is resorted to; for, independently of the fact that the practitioner is seldom at hand at the moment of death, the very time necessary to assure ourselves that life is actually extinct will generally be sufficient to cause the death of the fœtus. Considering the intimate relations between the mother and child, we can scarcely expect vitality to remain in the latter more than a quarter, or at the outside, half an hour, after it has ceased in the former. The recorded instances in which a living child were extracted ten, twelve, and even forty hours after death, were most probably cases in which the mother fell into a prolonged trance or swoon, during the continuance of which the child must have been removed. A few authentic cases, however, are known in which there can be no reasonable doubt that the operation was performed successfully several hours after the mother was actually dead. A well-known and interesting example is that of the Princess of Schwartzburgh, who perished one evening in a fire at Paris, and from whose body a living infant is said to have been removed on the morning of the following day.

Since, then, there is a chance, however slight, of saving

¹ *Monat. f. Geburt*, suppl. vol. 1861, p. 121.

² *Operat. Cæsar. après la Mort*, Paris, 1862.

the child's life, we are bound to perform the operation, even when so much time has elapsed as to render the chances of success extremely small. It might be considered almost superfluous to insist on the necessity of assuring ourselves of the mother's death before commencing the necessary incisions; but, unfortunately, numerous instances are known in which mistakes in diagnosis have been made, and in which the first steps of the operation have shown that the mother was still alive. The operation should, therefore, always be performed with the same care and caution as if the mother were living. If death have occurred during labour, some have advised version as a preferable alternative. This can only be resorted to, with any hope of success, if the passages be in a condition to admit of delivery with rapidity; otherwise the delay required for dilatation, even when forcibly accomplished, and the drawing of the child through the pelvis, will be almost necessarily fatal. The only argument in favour of version is, that it is less painful to the friends; and, if they manifest a decided objection to the Cæsarean section, there can be no reason why an attempt to save the child in this way should not be made.

We are, however, bound to perform it when an opportunity arises.

Necessity of care in the operation.

Delivery by turning after the death of the mother.

The causes of death after the Cæsarean section may, speaking generally, be classed under four principal heads; hæmorrhage, peritonitis and metritis, shock, and septicæmia. These are pretty much the same as those following ovariectomy, and the resemblance between the two operations is so great, that modern experience as to the best mode of performing ovariectomy, as well as regards the after treatment, may be taken as a guide in the management of cases of Cæsarean section.

Causes of death after the Cæsarean section.

Hæmorrhage to an alarming extent is a frequent complication, although seldom the cause of death. Thus out of 88 operations, the particulars of which have been carefully noted, severe hæmorrhage occurred in 14, 6 of which terminated successfully, and in 4 only could the fatal result be ascribed to the loss of blood. In 1 of these the source of the hæmorrhage is not mentioned, in another it came from the wound in the abdominal wall, and in the other 2, from the uterine incision being made directly over the placenta. In neither of the 2 latter was the loss of blood immediately fatal; for it was checked by uterine contraction, and only

Hæmorrhage is frequent, although seldom fatal.

recurred after many hours had elapsed. - The divided uterine sinuses, and the open mouths of the vessels at the placental site, are the most common sources of hæmorrhage.

Means of
avoiding
the risk.

Much may be done to diminish the risk of bleeding, but, even with every precaution, it must be a source of danger. Hæmorrhage from the abdominal wall may be best prevented by making the incision as nearly as possible in the line of the linea alba, so as not to wound the epigastric arteries, and by tying any bleeding vessels as we proceed. The principal loss of blood will be met with in dividing the uterus; and this will be greatest when the incision is near or over the placental site, where the largest vessels are met with. We are recommended to ascertain the position of the placenta by auscultation, and thus, if possible, to avoid opening the uterus near its insertion. But even if we admit the placental souffle to be a guide to its situation, if the placenta be attached to the anterior wall of the uterus, a knowledge of its position would not always enable us to avoid opening the uterus in its immediate vicinity. We must, in the event of its lying under the incision, rather hope to control the hæmorrhage by removing it at once from its attachments, and rapidly emptying the uterus. When the child has been removed there may be a large escape of blood; but this will generally be stopped by the contraction of the uterus, in the same manner as after natural labour. Should contraction not take place, the uterus may be firmly grasped for the purpose of exciting it. This plan is advocated by Winckel, who had a large experience in the operation; and by using free compression in this way, and making a point of not closing the wound until the uterus is firmly contracted, he has never met with any inconvenience from hæmorrhage. If bleeding continue, styptic applications may be used, as in a case reported by Hicks, who was obliged to swab out the uterine cavity with a solution of perchloride of iron.

Peritonitis and
metritis
are frequent
causes of
death.

Among the most frequent causes of death are peritonitis and metritis. Kayser attributes the fatal result to them in 77 out of 123 unsuccessful cases.

The mere division of the peritoneum will not account for the frequency of this complication, since its occurrence is considerably more frequent than after ovariectomy, in which the injury to the peritoneum is quite as great, and indeed

greater, if we take into account the adhesions which have to be divided or torn in that operation.

The division of the uterus must be regarded as one source of this danger. Dr. West lays great stress on its unfavourable condition after delivery for reparative action. He believes that the process of involution or fatty degeneration which commences in the muscular fibres previous to delivery, renders them peculiarly unfitted to cicatrise; and he points out that, on post-mortem examination, the edges of the incision have been found dry, of unhealthy colour, gaping, and showing no tendency to heal. On this account Hicks and others have operated ten days or more before the full period of labour, in the hope that the risk from this source might be avoided. It is by no means certain, however, that the change in the uterine fibres is the cause of the wound not healing, and involution will commence at once when the uterus is emptied, even if the full period of pregnancy have not arrived. As a point of ethics, moreover, it is questionable if we are justified in anticipating the date of so dangerous an operation, even by a few weeks, unless the benefit to be derived is very decided indeed.

Degeneration of the uterine fibres supposed to be unfavourable to repairs.

On this account some have operated before the full term of pregnancy. Objections to this plan.

One important cause of peritonitis is the escape of the lochia through the uterine incision into the cavity of the peritoneum, which there decompose and act as an unfailing source of irritation. This may be prevented, to a great extent, by seeing that the os uteri is patulous, so as to afford a channel for the escape of discharges, and by closing the uterine wound by sutures. In addition there is the danger arising from blood and liquor amnii escaping into the peritoneum, and subsequently decomposing. There is little evidence that 'la toilette du peritoine,' on which ovariologists now lay so much stress, has ever been particularly attended to in Cæsarean operations.

Escape of lochia, and other fluids into the peritoneal cavity.

The chief predisposing cause of these inflammations, however, must be looked for in the condition of the patient, just as asthenic inflammation in ovariectomy is most frequently met with in those whose general health is broken down by the long continuance of the disease. We are fully justified, therefore, in assuming that peritonitis and metritis will be more likely to occur after the Cæsarean section, when that operation has been unnecessarily delayed, and when the

The unhealthy condition of the patient is the chief source of danger.

patient is exhausted by a protracted labour. In proof of this we find that in the large proportion of the cases above mentioned, peritonitis occurred when the operation was performed under unfavourable conditions.

Septicæmia.

The sources of septicæmia are abundantly evident, not the least, probably, being absorption by the open vessels in the uterine incision.

Nervous shock.

The last great danger is general shock to the nervous system. In Kayser's 123 cases, 30 of the deaths are referred to this cause. In the large majority of these the patient was profoundly exhausted before the operation was begun. It is in predisposing to these nervous complications, that we should, *à priori*, expect that vacillation and delay would be most hurtful; and in operating when the patient's strength is still unimpaired, we afford her the best chance of bearing the inevitable shock of an operation of such magnitude.

Secondary dangers.

In addition a few cases have been lost from accidental complications, which are liable to occur after any serious operation, and which do not necessarily depend on the nature of the procedure.

Danger to child from portions of its body being caught by the contracting uterus.

There is only one source of danger, special to the child, which is worthy of attention. As the infant is being removed from the cavity of the uterus, the muscular parietes sometimes contract with great rapidity and force, so as to seize and retain some part of its body. This occurred in 2 of Dr. Radford's cases, and in 1 of them it is stated that 'the child was vigorously alive when first taken hold of, but, from the length of time occupied in extracting the head, it became so enfeebled as to show only slight signs of life,' and subsequently all attempts at resuscitation failed. I have myself seen the head caught in this way, and so forcibly retained that a second incision was required to release it. In Dr. Radford's cases the placenta happened to be immediately under the incision, and he attributes the inordinate and rapid contraction of the uterus to its premature separation. It is difficult to believe that this was more than a coincidence, because the contraction does not take place until the greater part of the child's body has been withdrawn, and because numerous cases are recorded in which the uterus was opened directly over the placenta, or in which it was lying loose and detached, in none of which

Causes of the accident.

this accident occurred. The true explanation may, I think, be found in the special irritability of the uterus in different cases.

Irrespective of the risk of portions of the child being caught and detained, rapid contraction is a distinct advantage, since the danger of hæmorrhage is thereby much diminished. Serious consequences may be best avoided by removing, when practicable, the head and shoulders of the child first, or by employing both hands in extraction, one being placed near the head, the other seizing the feet. Either of these methods is preferable to the common practice of laying hold of the part that may chance to lie most conveniently near the line of incision. If this point were properly attended to, although the detention of the lower extremities might occasionally occur, the life of the child would not be imperilled.

Mode of
avoiding
it.

The preparation of the patient for the operation should seriously occupy the attention of the practitioner, and this is the more essential, since almost all patients requiring the Cæsarcan section are in a wretchedly debilitated condition. If the patient be not seen until she is actually in labour, of course this is out of the question. But this will rarely be the case, since the deformed condition of the patient must generally have attracted attention. Every possible means should be taken, therefore, when practicable, to improve the general health by abundance of simple and nourishing diet, plenty of fresh air, and suitable tonics (amongst which preparations of iron should occupy a prominent place), while the state of the secretions, the bowels, skin, and kidneys, should be specially attended to. Whenever it is possible a large, airy apartment should be selected for the operation, which should never be done in a hospital, if other arrangements be practicable. These details may seem trivial and unnecessary; but to ensure success in so hazardous an undertaking, no care can be considered superfluous, and probably the want of attention to such points has had much to do with increasing the mortality.

Whenever
it is pos-
sible the
patient
should be
prepared
for the
operation.

Prelimi-
nary
prepara-
tions.

The question arises whether we should operate before labour has commenced. By selecting our own time, as some have advised, we certainly have the advantage of operating under the most favourable conditions, instead of possibly

Question
of time to
be selected
for the
operation.

hurriedly. There are, however, numerous advantages in waiting until spontaneous uterine action has commenced, which seem to me to more than counterbalance the advantages of choosing our own time. Prominent among these is the partial opening of the os uteri, so as to afford a channel for the escape of the lochia, and the certainty of active contraction in the uterus, to arrest hæmorrhage. Barnes recommends that premature labour should be first induced, and then the operation performed. This seems to me to introduce a needless element of complexity; and besides, in cases of great deformity, it is by no means always easy to reach the cervix with the view of bringing on labour. All needful arrangements should be made, so as to avoid hurry and excitement when the operation is commenced, and we may then wait patiently until labour has fairly set in.

The administration of chloroform to be avoided.

The operation itself is simple. The patient should be placed on a table, in a good light, and with the temperature of the room raised to about 65°. Chloroform has so frequently been followed by severe vomiting that it is probably better not to administer it. For the same reason Mr. Spencer Wells has long given up using it in ovariectomy, and finds that chloromethyl answers admirably. In one or two cases local anæsthesia has been used, by means of two spray producers acting simultaneously; and this plan, if the patient have sufficient fortitude to dispense with general anæsthesia, has the further advantage of stimulating the uterus to powerful contraction.

Description of the operation.

The incision should be made as much as possible in the line of the linea alba, so as to avoid wounding the epigastric arteries. On account of the deformity, the configuration of the abdomen is often much altered, and some have advised that the incision should be made oblique or transverse, and on the most prominent part of the abdomen. The risk of hæmorrhage being thus much increased, the practice is not to be recommended. The incision, commencing a little above the umbilicus, is carried down for about three inches below it. The skin and muscular fibres are carefully divided, layer by layer, until the shining surface of the peritoneum is reached, and any bleeding vessels should be secured as we proceed. A small opening is now made in the peritoneum, which should be laid open along the whole length of the

incision, upon two fingers of the left hand introduced as a guide. Before incising the uterus an assistant should carefully support it in a proper position, and push it forward by the hands placed on either side of the incision, so as to bring its surface into apposition with the external wound, and prevent the escape of the intestines. If we have reason to believe that the placenta is situated anteriorly, we may incise the uterus on one or other side; otherwise the line of incision should be as nearly as possible central. The substance of the uterus is next divided until the membranes are reached, which are punctured, and divided in the same way as the peritoneum. The uterine incision should be of the same length as that in the abdomen, and it should not be made too near the fundus; for not only is that part more vascular than the body of the uterus, but wounds in that situation are more apt to gape, and do not cicatrise so favourably. After the uterus is opened, Dr. Winckel recommends that the fingers of an assistant should be placed in the two terminal angles of the wound, so that the ends of the incision may be hooked up, and brought into close apposition with the abdominal opening. By this means he prevents not only the escape of blood and liquor amnii into the cavity of the peritoneum, but also the protrusion of the abdominal viscera.

The child should now be carefully removed, the head and shoulders being taken out (if possible) first; the placenta and membranes are afterwards extracted. Should the placenta be unfortunately found immediately under the incision, a considerable loss of blood is likely to take place, which can only be checked by removing it from its attachments, and concluding the operation as rapidly as possible.

Removal
of the
child.

As soon as the child and the secundines have been extracted, the sooner the uterus contracts the better. It will usually do so of itself, but should it remain lax and flabby, it should be pressed and stimulated by the hand. We are specially warned against handling the uterus by Ramsbotham and others; but there seems no valid reason why we should not restrain hæmorrhage in this way, as after a natural labour. The intervention of the abdominal parietes, in their lax condition after delivery, can make very little difference between the two cases.

Import-
ance of
securing
uterine
contrac-
tion.

Closure of
the uterine
and abdominal
wounds.

The advisability of closing the uterine wound by sutures is a mooted point. The balance of evidence is certainly in favour of this practice, as tending to prevent the escape of the lochia into the peritoneal cavity. Interrupted sutures of silver wire may be used, and cut short; or, as successfully practised by Spencer Wells, a continuous silk suture may be applied, one end being passed through the os into the vagina, by which it is subsequently withdrawn. Before closing the uterine wound one or two fingers should be passed through the cervix, to ensure its being patulous. A free escape of the lochia in this direction is of great consequence, and Winckel even advises the placing of a strip of lint, soaked in oil, in the os, so as to keep up a free exit for the discharge.

The abdominal
wound
should not
be closed
until hæ-
morrhage
has ceased.

A point of great importance, and not sufficiently insisted on, is the advisability of not closing the abdominal wound until we are thoroughly satisfied that hæmorrhage is completely stopped, since any escape of blood into the peritoneum would very materially lessen the chances of recovery. In a successful case reported by Dr. Newman,¹ the wound was not closed for nearly an hour. Before doing so all blood and discharges should be carefully removed from the peritoneal cavity, by clean soft sponges dipped in warm water. The abdominal wound should be closed from above downwards, by harelip pins, wire, or silk sutures, which should be inserted at a distance of an inch from each other, and passed entirely through the abdominal walls and the peritoneum, at some little distance from the edge of the incision, so as to bring the two surfaces of the peritoneum into contact. By this means we ensure the closure of the peritoneal cavity, the opposed surfaces adhering with great rapidity. The surface of the wound is then covered with pads of folded lint, kept in position by long strips of adhesive plaster, and the whole covered with a soft flannel belt.

Subse-
quent
manage-
ment.

Into the subsequent treatment it is unnecessary to enter at any length, since it must be regulated by general principles, each symptom being met as it arises. It has been customary to administer opiates freely after the operation; but they seem to have a tendency to produce sick-

¹ *Obst. Trans.* vol. viii.

ness and vomiting, and ought not to be exhibited unless pain or peritonitis indicate that they are required. In fact, the treatment should in no way differ from that usual after ovariectomy, and the principles that should guide us will be best shown by the following quotation from Mr. Spencer Wells' description of that operation:—'The principles of after treatment are—to secure extreme quiet, comfortable warmth, and perfectly clean linen to the patient; to relieve pain by warm applications to the abdomen, and by opiate enemata; to give stimulants when they are called for by failing pulse or other signs of exhaustion; to relieve sickness by ice, or iced drinks; and to allow plain, simple, but nourishing food. The catheter must be used every six or eight hours, until the patient can move without pain. The sutures are removed on the third day, unless tympanitic distension of the stomach or intestines endanger re-opening of the wound. In such circumstances they may be left for some days longer. The superficial sutures may remain until union seems quite firm.'

Bearing in mind the great mortality attending the Cæsarean section, it is not surprising that obstetricians should have anxiously considered the possibility of devising a substitute, which should afford the mother a better chance of recovery. The first proposal of the kind was one from which great results were at first anticipated. In 1768 Sigault, then a student of medicine in Paris, suggested *symphysectomy*, which consists in the division of the symphysis pubis, with the view of allowing the pubic bones to separate sufficiently to admit of the passage of the child. Although at first strongly opposed, it was subsequently ardently advocated by many obstetricians, and was often performed on the Continent, and in a few cases in this country.

Substitutes for the Cæsarean section.

Symphysectomy.

It is generally admitted that it is quite impossible to make this a substitute for the Cæsarean section, since the utmost gain which even a wide separation of the symphysis pubis would give would be altogether insufficient to admit of the passage of even a mutilated foetus. Dr. Churchill concludes that, even if it were possible to separate the pubes to the extent of 4 inches, we should only have an increase of from 4 lines to $\frac{1}{2}$ inch in the antero-posterior diameter, in which the obstruction is generally most marked. In the lesser

The operation is admitted to be useless.

degrees of deformity this might possibly be sufficient to allow the fœtus to pass; but the risk of the operation itself, and the subsequent ill effects, altogether contra-indicate it in cases of this description.

Gastro-
elytro-
tomy.

A far more promising operation is one which was originally suggested by Jorg and Ritgen in 1820, under the name of *Gastro-Elytrotomy*, but which, in the then defective state of abdominal surgery, scarcely received attention, and has not even been alluded to in any of our standard obstetric works. It has recently been reconsidered by Professor Thomas, of New York, in an excellent paper which is well worthy of study,¹ and he has actually performed it in a moribund patient, and extracted a living child.

Object of
the opera-
tion.

In this operation it is proposed to divide the vagina at its juncture with the cervix, this being reached by an incision extending from the symphysis pubis to the anterior superior spine of the ilium. The loosely-attached peritoneum is then raised up, and the child removed through the os uteri by turning, and extracted through the opening in the abdomen. It must be at once apparent that the chief dangers of the Cæsarean section are obviated; for the peritoneal cavity is not opened (and, therefore, the risk of peritonitis is much lessened), there is no escape of blood into the peritoneum, and the uterus itself is not incised. The operation, as described and performed by Thomas, is as follows :—

If prac-
ticable
the opera-
tion has
many
obvious
advan-
tages over
the Cæ-
sarean
section.

Descrip-
tion of the
operation.

1st. An incision is made extending from the symphysis pubis to the anterior-superior spine of the ilium, dividing the thickness of the abdominal walls until the peritoneum is reached.

2nd. The peritoneum is lifted up by means of the fingers, or by metal retractors, so as to admit of the juncture of the vagina and uterus being reached. So far the operation is precisely that which is practised by surgeons for the ligature of the iliac arteries, and offers no particular difficulties.

3rd. The vagina is made to protrude in the wound by means of a metal sound, introduced through the vulva, and divided to a sufficient extent.

4th. This will allow the cervix to be reached, and it is drawn into the iliac fossa by a blunt hook passed into it,

¹ *American Journal of Obstetrics*, vol. iii.

while the fundus uteri is depressed by an assistant in an opposite direction. If the os uteri be sufficiently open, (and if possible it should have been previously dilated with caoutchouc bags), the hand is passed into the uterus, and the child removed by turning.

Dr. Thomas describes two cases in which he has performed this operation—one in the dead subject at the full period of pregnancy, and the other on a woman moribund from pneumonia. In the latter case the child was extracted alive; the mother was at the last gasp when the operation was performed, so that nothing can be said as to its effects on her. In neither was there the slightest difficulty experienced in any step of the operation.

No one who has seen much of ovariectomy could reasonably hold that there is anything in the procedure incompatible with success. Whether subsequent experience will justify the hopes that Dr. Thomas holds out, remains to be seen. Of course, all that can now be said of it is, that the operation is theoretically sufficiently simple, and that it offers a possible way of removing the child, without some of the gravest risks of the Cæsarean section. The greatest danger attending it seems to be that of hæmorrhage, for there are large vessels at the upper part of the vagina which must be cut through. This would probably, however, be quite within the power of control, either by ligatures, or, as Thomas suggests, by passing a metallic speculum either through the abdominal wound or the vagina, and applying through it the actual cautery or the perchloride of iron. No difficulty need be anticipated in retracting the peritoneum to a sufficient extent, for in pregnancy that membrane is unusually ample, and much more loose in its attachments than in the non-pregnant state.

Theoretically the operation promises well.

CHAPTER VII.

THE TRANSFUSION OF BLOOD.

Transfusion has never been popularised in obstetric practice.

THE transfusion of blood in desperate and apparently hopeless cases of hæmorrhage, offers a possible means of rescuing the patient which merits careful consideration. It has again and again attracted the attention of the profession, but has never become popularised in obstetric practice. The reason of this is not so much the inherent defects of the operation itself—for quite a sufficient number of successful cases are recorded to make it certain that it is occasionally a most valuable remedy—but the fact that the operation has been considered a delicate and difficult one, and that it has been deemed necessary to employ complicated and expensive apparatus, which is never at hand when a sudden emergency arises. Whatever may be the difference of opinion about the value of transfusion, I think it must be admitted that it is of the utmost consequence to simplify the process in every possible way, and it is above all things necessary to show that the steps of the operation are such as can be readily performed by any ordinarily-qualified practitioner, and that the apparatus is so simple and portable as to make it easy for any obstetrician to have it at hand. There are comparatively few who would consider it worth while to carry about with them, in ordinary every-day work, cumbrous and expensive instruments which may never be required in a life-long practice; and hence it is not unlikely that, in many cases in which transfusion might have proved useful, the opportunity of using it has been allowed to slip. Of late years the operation has attracted much attention, the method of performing it has been greatly simplified, and I think it will be easy to prove that all the essential apparatus may be purchased for a few shillings, and in so portable a form as to take up little or no room; so that it may be

Of late years the operation has been much simplified.

always carried in the obstetric bag ready for any possible emergency.

The history of the operation is of considerable interest. In Villari's 'Life of Savonarola' it is said to have been employed in the case of Pope Innocent VIII., in the year 1492, but I am not aware on what authority the statement is made. The first serious proposals for its performance do not seem to have been made until the latter half of the seventeenth century. It was first actually performed in France by Denis, of Montpellier, although Lower, of Oxford, had previously made experiments on animals, which satisfied him that it might be undertaken with success. In November, 1667, some months after Denis' case, he made a public experiment at Arundel House, in which twelve ounces of sheep's blood were injected into the veins of a healthy man, who is stated to have been very well after the operation, which must, therefore, have proved successful. These nearly simultaneous cases gave rise to a controversy as to priority of invention, which was long carried on with much bitterness.

History of
the operation.

The idea of resorting to transfusion after severe hæmorrhage does not seem to have been then entertained. It was recommended as a means of treatment in various diseased states, or with the extravagant hope of imparting renewed life and vigour to the old and decrepit. The blood of the lower animals only was used; and, under these circumstances, it is not surprising that the operation, although practised on several occasions, was never established as it might have been had its indications been better understood.

From that time it fell almost entirely into oblivion, although experiments and suggestions as to its applicability were occasionally made, especially by Dr. Harwood, Professor of Anatomy at Cambridge, who published a thesis on the subject in the year 1785. He, however, never carried his suggestions into practice, and, like his predecessors, only proposed to employ blood taken from the lower animals. In the year 1824 Dr. Blundell published his well-known work entitled, 'Researches, Physiological and Pathological,' which detailed a large number of experiments; and to that distinguished physician belongs the undoubted merit of having brought the subject prominently before the profession, and of pointing out the cases in which the operation might be

performed with hopes of success. Since the publication of this work, transfusion has been regarded as a legitimate operation under special circumstances; but, although it has frequently been performed with success, and in spite of many interesting monographs on the subject, it has never become so established, as a general resource in suitable cases, as its advantages would seem to warrant. Within the last few years more attention has been paid to the subject, and the writings of Panum, Martin, and de Belina, abroad, and of Higginson, McDonnell, Hicks, and Aveling at home, amongst many others, have thrown much light on many points connected with the operation, and it is to be hoped that the committee appointed by the Obstetrical Society, in their forthcoming Report, may still more increase our knowledge.

Nature
and object
of the
operation.

Transfusion is practically only employed in cases of profuse hæmorrhage connected with labour, although it has been suggested as possibly of value in certain other puerperal conditions, such as eclampsia, or puerperal fever. Theoretically it may be expected to be useful in such diseases; but, inasmuch as little or nothing is known of its practical effects in these diseased states, it is only possible here to discuss its use in cases of excessive hæmorrhage. Its action is probably twofold. 1st, the actual restitution of blood which has been lost. 2nd, the supply of a sufficient quantity of blood to stimulate the heart to contraction, and thus to enable the circulation to be carried on until fresh blood is formed. The influence of transfusion as a means of restoring lost blood must be trivial, since the quantity required to produce an effect is generally very small indeed, and never sufficient to counterbalance that which has been lost. Its stimulant action is no doubt of far more importance; and if the operation be performed before the vital energies are entirely exhausted, the effect is often most marked.

Use of
blood
taken from
the lower
animals.

In the earliest operations the blood used was always that of the lower animals, generally of the sheep. Dr. Blundell believed that such blood could not be employed with success. Recent cases, such as those published by Keene, who used lamb's blood in 12 cases,¹ have conclusively proved this idea

¹ *Lond. Med. Record*, Dec. 31, 1873.

to be erroneous. Brown-Séquard has shown that Blundell's experiments with animal blood failed, partly because he used too large a quantity and injected too quickly, and partly because he used blood too rich in carbonic acid and too poor in oxygen. He has shown that the success of the operation must depend to a great extent on these points, and that blood, containing sufficient carbonic acid to be black, proves directly poisonous, unless it is injected in very small quantity, and with great slowness. Although, then, it is certain that the blood of some of the lower animals, especially of those in which the corpuscles are of less size than in man, as in sheep, can be employed with safety, still the operation, of late years, has been almost always performed with human blood alone, and, for many obvious reasons, is always likely to be so.

The great practical difficulty in transfusion has always been the coagulation of the blood very shortly after it has been removed from the body. When fresh drawn blood is exposed to the atmosphere, the fibrine commences to solidify rapidly, generally in from three to four minutes, sometimes much sooner. It is obvious that the moment fibrination has commenced the blood is, *ipso facto*, unfitted for transfusion, not only because it can be no longer passed readily through the injecting apparatus, but because of the great danger of propelling small masses of solidified fibrine into the circulation, and thus causing embolism. Hence, if no attempt be made to prevent this difficulty, it is essential, no matter what apparatus is used, to hurry on the operation so as to inject before fibrination has begun. This is a fatal objection, for there is no operation in the whole range of surgery in which calmness and deliberation are so essential, the more so as the surroundings of the patient in these unfortunate cases are such as to tax the presence of mind and coolness of the practitioner and his assistants to the utmost.

Difficulties
from co-
agulation
of fibrine.

All the recent improvements have had for their object the avoidance of coagulation, and practically this has been effected in one of three ways. 1st, by mediate transfusion from arm to arm, without allowing the blood to be exposed to the atmosphere, according to the method proposed by Aveling. 2nd, by adding to the blood certain

Methods of
obviating
these.

chemical reagents which have the property of preventing coagulation. 3rd, removal of the fibrine entirely, by promoting its coagulation and straining the blood, so that the liquor sanguinis and blood corpuscles alone are injected.

Inasmuch as the success of the operation altogether depends on the method adopted, it will be well, before going further, to consider briefly the advantages and disadvantages of each of these plans.

Mediate
transfu-
sion.

1. The method of mediate transfusion has within the last few years been brought prominently before the profession by Dr. Aveling, who has invented an ingenious apparatus for performing it. It consists essentially of a miniature Higginson's syringe, without valves, and with a small silver canula at either end. One of these is inserted into the vein of the person supplying blood, the other into that of the patient, and by a peculiar manipulation of the syringe, subsequently to be described, the blood is carried from one vein into the other. It must be admitted that, if there were no practical difficulties, this instrument would be theoretically admirable, and it is therefore not surprising that it should have met with so much favour from the profession. I cannot but think, however, that the operation is not so simple as it at first sight appears, and that therefore it wants one of the essential elements required in any procedure for performing transfusion. One of my objections is, that it is by no means easy to work the apparatus without considerable practice. Of this I have satisfied myself by asking members of my class to work it after reading the printed directions, and finding that they are not always able to do so at once. Of course it may be said that it is easy to acquire the necessary manipulative skill, which it no doubt is; but, when the necessity for transfusion arises, there is no time left for practising with the instrument, and it is essential that an apparatus, to be universally applicable, should be capable of being used immediately, and without previous experience. Other objections are the necessity of several assistants, the uncertainty of there being a sufficient circulation of blood in the veins of the donor to afford a constant supply, and the possibility of the whole apparatus being disturbed by restlessness or jactitation on the part of the patient. For these reasons, it seems to me that the plan of mediate transfusion

is not so simple, nor so generally applicable, as defibrination. Still, it is impossible not to recognise its merits, and it is certainly well worthy of further study and investigation.

2. The second plan for obviating the bad effects of clotting is the addition of some substance to the blood which shall prevent coagulation. It is well known that several salts have this property, and the experiments made in the case of cholera patients prove that solutions of some of them may be injected into the venous system without injury. This method has been specially advocated by Dr. Braxton Hicks, who uses a solution of three ounces of fresh phosphate of soda in a pint of water, about six ounces of which are added to the quantity of blood to be injected. He has narrated 4 cases¹ in which this plan was adopted successfully, so far as the prevention of coagulation was concerned. It certainly enables the operation to be performed with deliberation and care, but it has the drawback of being somewhat complicated; and it may often happen that the necessary chemicals are not at hand. A further objection is the bulk of fluid which must be injected, and there is reason to believe that this has, in some cases, seriously embarrassed the heart's action, and interfered with the success of the operation. In many of the successful cases of transfusion the amount of blood injected has been very small, not more than two ounces. Dr. Richardson proposes to prevent coagulation by the addition of small quantities of liquor ammoniæ to the blood, in the proportion of two minims, diluted with twenty minims of water, to each ounce of blood.

Addition of chemical agents to prevent coagulation.

3. The last method, and the one which, on the whole, I believe to be the simplest and most effectual, is defibrination. It has been chiefly practised in this country by Dr. McDonnell, of Dublin, who has published several very interesting cases in which he employed it, and abroad by Martin of Berlin, and de Belina of Paris. The process of removing the fibrine is simple in the extreme, and occupies a few minutes only. Another advantage is that the blood to be transfused may be prepared quietly in an adjoining apartment, so that the operation may be performed with the greatest calmness and deliberation, and the donor is spared the excitement and distress which the sight of the apparently moribund patient

Defibrination of the blood.

¹ *Guy's Hosp. Reports*, vol. xiv.

is apt to cause, and which, as Dr. Hicks has truly pointed out, may interfere with the free flow of blood. The researches of Panum, Brown-Séguard, and others, have conclusively proved that the blood corpuscles are the true vivifying element, and that defibrinated blood acts as well, in every respect, as that containing fibrine. It has been proved that the fibrine is reproduced within a short time,¹ and the whole tendency of modern research is to regard it, not as an essential element of the blood, but as an excrementitious product, resulting from the degradation of tissue, which may, therefore, be advantageously removed. Another advantage derived from defibrination is, that the corpuscles are freely exposed to the atmosphere, oxygen is taken up, and carbonic acid given off, and the dangers, which Brown-Séguard has shown to arise from the use of blood containing too much carbonic acid, are thereby avoided. There can be, therefore, no physiological objection to removal of the fibrine, which, moreover, takes away all practical difficulty from the operation. The straining to which the defibrinated blood is subjected entirely prevents the possibility of even the most minute particle of fibrine being contained in the injected fluid; the risk from embolism is, therefore, less than in any of the other processes already referred to. My own experience of this plan is limited to a single case, but in that it answered so well, that I can conceive of no reasonable objection to it. I should be inclined to say that transfusion, thus performed, is amongst the simplest of surgical operations—an opinion which the experience of McDonnell and others fully confirms.

Statistical
results.

The number of cases of transfusion are perhaps not sufficient to admit of completely reliable conclusions. It is certain, however, that transfusion has often been the means of rescuing the patient when apparently at the point of death, and after all other means of treatment had failed. Professor Martin records 57 cases, in 43 of which transfusion was completely successful, and in 7 temporarily so; while in the remaining 7 no reaction took place. Dr. Higginson, of Liverpool, has had 15 cases, 10 of which were successful. Figures such as these are encouraging, and they are sufficient to prove that the operation is one which at least offers a fair

¹ Panum, *Virchow's Arch.* vol. xxvii.

hope of success, and which no obstetrician would be justified in neglecting, when the patient is sinking from the exhaustion of profuse hæmorrhage. It is to be hoped also that further experience may prove it to be of value in other cases, in which its use has been suggested, but not, as yet, put to the test of experiment.

The possible risks of the operation would seem to be the danger of injecting minute particles of fibrine which form emboli, or bubbles of air, or of overwhelming the action of the heart by injecting too rapidly, or in too great quantity. These may be, to a great extent, prevented by careful attention to the proper performance of the operation, and it does not clearly appear, from the recorded cases, that they have ever proved fatal. We must also bear in mind that transfusion is seldom or ever likely to be attempted until the patient is in a state which would otherwise almost certainly preclude the hope of recovery, and in which, therefore, much more hazardous proceedings would be fully justified.

Possible dangers of the operation.

The cases suitable for transfusion are those in which the patient is reduced to an extreme state of exhaustion from hæmorrhage during or after labour or miscarriage, whether this is caused by the repeated losses of placenta prævia, or the more sudden and profuse flooding of post-partum hæmorrhage. The operation will not be contemplated until other and simpler means have been tried and failed, or until the symptoms indicate that life is on the verge of extinction. If the patient should be deadly pale and cold, with no pulse at the wrist, or one that is scarcely perceptible; if she be unable to swallow, or vomits incessantly; if she lie in an unconscious state; if jactitation, or convulsions, or repeated faintings should occur; if the respiration be laborious, or very rapid and sighing; if the pupil do not act under the influence of light; it is evident that she is in a condition of extreme danger, and it is, under such circumstances, that transfusion, performed sufficiently soon, offers a fair prospect of success. It does not necessarily follow because one or other of these symptoms is present, that there is no chance of recovery under ordinary treatment, and indeed it is within the experience of all, that patients have rallied under apparently the most hopeless conditions. But when several of them occur together, the prospect of recovery is much dimi-

Cases suitable for transfusion.

nished, and transfusion would then be fully justified, especially as there is no reason to think that a fatal result has ever been directly traced to its employment. Indeed, like most other obstetric operations, it is more likely to be postponed until too late to be of service, than to be employed too early, and in some of the cases reported as unsuccessful, it was not performed until respiration had ceased, and death had actually taken place. It has been sometimes said that transfusion can never be employed if the uterus be not firmly contracted, so as to prevent the injected blood again escaping through the uterine sinuses. The cases in which this is likely to occur are few; and if one were met with, the escape of blood could be prevented by the injection into the uterus of the perchloride of iron.

Description of the operation.

Complex and special instruments are not necessary.

In describing the operation I shall limit myself to an account of Aveling's method of mediate transfusion, and to that of injecting defibrinated blood. I consider myself justified in omitting any account of the numerous complex apparatuses which have been invented for the purpose of injecting pure blood, since I believe the practical difficulties are too great ever to render this form of operation serviceable. The great objection to most of the instruments used is their cost and complexity; and as long as any special apparatus is considered essential, the full benefits to be derived from transfusion are not likely to be realised. The necessity for employing it arises suddenly; it may be in a locality in which it is impossible to procure a special instrument; and it would be well if it were understood that transfusion may be safely and effectually performed by the simplest means. In many of the successful cases an ordinary syringe was used; in one, in the absence of other instruments, a child's toy syringe was employed. I have myself performed it with a simple syringe purchased at the nearest chemist's shop, when a special transfusion apparatus failed to act satisfactorily.

Method of performing mediate transfusion.

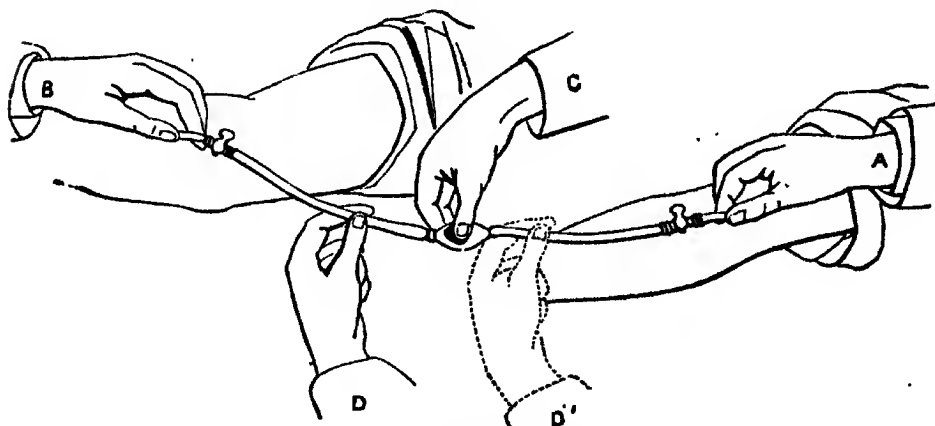
In mediate transfusion (fig. 166), the donor is seated close to the patient, and the veins in the arms of each having been opened, the silver canula at either end of the instrument is introduced into them (A B). The tube between the bulb and the patient is now pinched (D), so as to form a vacuum, and the bulb becomes filled with blood from the donor. The finger is now removed so as to compress the distal tube

(D'), and the bulb being compressed (c), its contents are injected into the patient's vein. The bulb is calculated to hold about two drams, so that the amount injected can be estimated by the number of times it is emptied. The risk of injecting air is prevented by filling the syringe with water, which is first injected before the blood.

For injecting defibrinated blood various contrivances have been used. McDonnell's instrument is a simple cylinder with a nozzle attached, from which the blood is propelled by gravitation. When the propulsive power is insufficient, an increased pressure is applied by breathing forcibly into the open end of the receiver. De Belina's instrument is on the

Injection
of defi-
brinated
blood.

Fig. 166.



METHOD OF TRANSFUSION BY AVELING'S APPARATUS.

same principle, only atmospheric pressure is supplied by a contrivance similar to Richardson's spray producer, attached to one end. The idea is simple, but there is some doubt of a gravitation instrument being sufficiently powerful, and it certainly failed in my hands. I have had valves applied to Aveling's instrument, so that it works by compression of the bulb, like an ordinary Higginson's syringe. This, with a single silver canula at one end, for introduction into the vein, forms a perfect transfusion apparatus, taking up scarcely any space, and extremely inexpensive. If it be not at hand, any small syringe, with a tolerably fine nozzle, may be used.

The first step of the operation is defibrination of the blood, which should, if possible, be prepared in an apartment

Mode of
preparing
the blood.

adjoining the patient's. The blood to be injected should be taken from the arm of a strong and healthy man. The quality cannot be unimportant, and, in some recorded cases, the failure of the operation has been attributed to the fact of the emittent having been a weakly female. The supply from a woman might also prove insufficient; and, although it has been shown that blood from two or more persons may be used with safety, yet such a change necessarily causes delay, and should, if possible, be avoided. A vein having been opened, eight or ten ounces of blood are withdrawn, and received into some perfectly clean vessel, such as a dessert finger-glass. As it flows it should be briskly agitated with a clean silver fork, or a glass rod, and, very shortly, strings of fibrine begin to form. It is now strained through a piece of fine muslin, previously dipped in hot water, into a second vessel which is floating in water at a temperature of about 105°. By this straining the fibrine and air bubbles resulting from the agitation are removed, and, if there be no excessive hurry, it might be well to repeat the straining a second time. If the vessel be kept floating in the warm water, the blood is prevented from getting over cool, and we can now proceed to prepare the arm of the patient for injection.

Mode of
exposing
the veins
selected
for trans-
fusion.

This is the most delicate and difficult part of the operation, since the veins are generally collapsed and empty, and by no means easy to find. The best way of exposing them is that practised by McDonnell, who pinches up a fold of the skin at the bend of the elbow, and transfixes it with a fine tenotomy knife or scalpel, so making a gaping wound in the integument, at the bottom of which the veins are seen lying. A probe should now be passed underneath the vein selected for opening, so as to avoid the chance of its being lost at any subsequent stage of the operation. This is a point of some importance, and from the neglect of this precaution I have been obliged to open another vein than that originally fixed on. A small portion of the vein being raised with the forceps, a nick is made into it for the passage of the canula.

Injection
of the
blood.

The prepared blood is now brought to the bedside, and, the apparatus having been previously filled with blood to avoid the risk of injecting any bubbles of air, the canula is inserted

into the opening made in the vein, and transfusion commenced. It should be constantly borne in mind that this part of the operation should be conducted with the greatest caution, the blood introduced very slowly, and the effect on the patient carefully watched. The injection may be proceeded with until some perceptible effect is produced, which will generally be a return of the pulsation, first at the heart, and subsequently at the wrist, an increase in the temperature of the body, greater depth and frequency of the respirations, and a general appearance of returning animation about the countenance. Sometimes the arms have been thrown about, or spasmodic twitchings of the countenance have taken place. The quantity of blood required to produce these effects varies greatly, but in the majority of cases has been very small. Occasionally 2 ounces have proved sufficient, and the average may be taken as ranging between 4 and 6, although in a few cases between 10 and 20 have been used. The practical rule is to proceed very slowly with the injection until some perceptible result is observed. Should embarrassed or frequent respiration supervene, we may suspect that we have been injecting either too great a quantity of blood, or with too much force and rapidity, and the operation should at once be suspended, and not resumed until the suspicious symptoms have passed away. It may happen that the effects of the transfusion have been highly satisfactory, but that in the course of time evidence of returning syncope shows itself. This tendency may possibly be prevented by the administration of stimulants and general treatment; but if these fail there is no reason why a fresh supply of blood should not again be injected, but this should be done before the effects of the first transfusion have entirely passed away.

Effects of
successful
transfu-
sion.

The subsequent effects in successful cases of transfusion merit careful study. In some few cases death is said to have happened within a few weeks with symptoms resembling pyæmia. Too little is known on this point, however, to justify any positive conclusions with regard to it.

Secondary
effects of
transfu-
sion.

P A R T V.

THE PUERPERAL STATE.

CHAPTER I.

THE PUERPERAL STATE AND ITS MANAGEMENT.

THE key to the management of women after labour, and to the proper understanding of the many important diseases which may then occur, is to be found in a study of the phenomena following delivery, and of the changes going on in the mother's system during the puerperal period. No doubt natural labour is a physiological and healthy function, and during recovery from its effects disease should not occur. It must not be forgotten, however, that none of our patients are under physiologically healthy conditions. The surroundings of the lying-in woman, the effects of civilisation, of errors of diet, of defective cleanliness, of exposure to contagion, and of a hundred other conditions, which it is impossible to appreciate, have most important influences on the results of childbirth. Hence it follows that labour, even under the most favourable conditions, is attended with considerable risk.

Importance of studying the puerperal state.

It is not easy to say with accuracy what is the precise mortality accompanying childbirth in ordinary domestic practice, since the returns derived from the reports of the Registrar-General, or from private sources, are manifestly open to serious error. The nearest approach to a reliable estimate is that made by Dr. Matthews Duncan,¹ who calculates, from figures derived from various sources, that not fewer than 1 out of every 120 women, delivered at or near the full time, dies within four weeks of childbirth. This indicates a mortality far above that which has been generally believed to accompany child-bearing under favourable circumstances. It,

The mortality of childbirth.

¹ 'The Mortality of Childbed,' *Edin. Med. Journ.* Nov. 1869.

however, closely approximates to a similar estimate made by McClintock,¹ who calculates the mortality in England and Wales as 1 in 126; and in the upper and middle classes alone, where the conditions may naturally be supposed to be more favourable, as 1 in 146. In these calculations there are some obvious sources of error, since they include deaths from all causes within four weeks of delivery, some of which must have been independent of the puerperal state.

But it is not the deaths alone which should be considered. All practitioners know how large a number of their patients suffer from morbid states which may be directly traced to the effects of child-bearing. It is impossible to arrive at any statistical conclusion on this point, but it must have a very sensible and important influence on the health of child-bearing women.

Alterations
in the
blood after
delivery.

The state of the blood during pregnancy, already referred to, has an important bearing on the puerperal state. There is marked hyperinosis, which is largely increased by the changes going on immediately after the birth of the child; for then the large supply of blood, which has been going to the uterus, is suddenly stopped, and the system must also get rid of a quantity of effete matter thrown into the circulation, in consequence of the degenerative changes occurring in the muscular fibres of the uterus. Hence all the depurative channels, by which this can be eliminated, are called on to act with great activity. If, in addition, the peculiar condition of the generative tract itself be borne in mind—viz., the large open vessels on its inner surface—the partially bared inner surface of the uterus itself, and the channels for absorption existing in consequence of slight lacerations in the cervix or vagina, it is not a matter of surprise that septic diseases should be so common.

Condition
after de-
livery.

It will be well to consider successively the various changes going on after delivery, and then we shall be in a better position for studying the rational management of the puerperal state.

Nervous
shock.

Some degree of nervous shock or exhaustion is observable after most labours. In many cases it is entirely absent; in others it is well marked. Its amount is in proportion to the severity of the labour, and the susceptibility of the patient;

¹ *Dublin Quarterly Journ.* Aug. 1869.

and it is, therefore, most likely to be excessive in women who have suffered greatly from pain, who have undergone much muscular exertion, or who have been weakened from undue loss of blood. It is evidenced by a feeling of exhaustion and fatigue, and not uncommonly there is some shivering, which soon passes off, and is generally followed by refreshing sleep. The extreme nervous susceptibility continues for a considerable time after delivery, and indicates the necessity of keeping the lying-in patient as free from all sources of excitement as possible.

Immediately after delivery the pulse falls, and the importance of this, as indicating a favourable state of the patient, has already been alluded to. The condition of the pulse has been carefully studied by Blot,¹ who has shown that this diminution, which he believes to be connected with an increased tension in the arteries, due to the sudden arrest of the uterine circulation, continues, in a large proportion of cases, for a considerable number of days after delivery; and, as a matter of clinical import, as long as it does, the patient may be considered to be in a favourable state. In many instances the slowness of the pulse is remarkable, often sinking to 50 or even 40 beats per minute. Any increase above the normal rate, especially if at all continuous, should always be carefully noted, and looked on with suspicion. In connection with this subject, however, it must be remembered that in puerperal women the most trivial circumstances may cause a sudden rise of the pulse. This must be familiar to every practical obstetrician, who has constant opportunities of observing this effect after any transient excitement or fatigue. In lying-in hospitals it has generally been observed, that the occurrence of any particularly bad case will send up the pulse of all the other patients who may have heard of it.

Fall of the pulse.

The temperature in the lying-in state affords much valuable information. During, and for a short time after labour, there is a slight elevation. It soon falls to, or even somewhat below, the normal level. Squire found that the fall occurred within 24 hours, sometimes within 12 hours, after the termination of labour.² For a few days there is often a slight

Temperature in the puerperal state.

¹ *Arch. Gén. de Méd.* 1864.

² 'Puerperal Temperatures,' *Obstet. Trans.* vol. ix.

increase of temperature, which is probably caused by the rapid oxidation of tissue in connection with the involution of the uterus. In about ~~forty-eight~~ hours there is a rise connected with the establishment of lactation, amounting to one or two degrees over the normal level; but this again subsides as soon as the milk is freely secreted. Credé has also shown¹ that rapid, but transient, rises of temperature may occur at any period, connected with trivial causes, such as constipation, errors of diet, or mental disturbances. But, if there be any rise of temperature which is at all continuous, especially to over 100° Fahr., and associated with rapidity of the pulse, there is reason to fear the existence of some complication.

The secretions and excretions.

The various secretions and excretions are carried on with increased activity after labour. The skin especially acts freely, the patient often sweating profusely. There is also an abundant secretion of urine, but not uncommonly a difficulty of voiding it, either on account of temporary paralysis of the neck of the bladder, resulting from the pressure to which it has been subjected, or from swelling and occlusion of the urethra. For the same reason the rectum is sluggish for a time, and constipation is not unfrequent. The appetite is generally indifferent, but the patient is often thirsty.

Secretion of milk.

Generally in about ~~forty-eight~~ hours the secretion of milk becomes established, and this is occasionally accompanied by a certain amount of constitutional irritation. The breasts often become turgid, hot, and painful. There may, or may not, be some general disturbance, quickening of pulse, elevation of temperature, possibly slight shivering, and a general sense of oppression, which are quickly relieved as the milk is formed, and the breasts emptied by suckling. Squire says, that the most constant phenomenon connected with the temperature is a slight elevation as the milk is secreted, rapidly falling when lactation is established. Barker noted elevation, either of temperature or pulse, in only 4 out of 52 cases which were carefully watched. There can be little doubt that the importance of the so-called 'milk fever' has been immensely exaggerated, and its existence, as a normal accompaniment of the puerperal state, is more than doubtful. It is certain, however, that, in a

Milk-fever not a normal phenomenon.

¹ *Mon. f. Geburt*, Dec. 1868.

small minority of cases, there is an appreciable amount of disturbance about the time that the milk is formed. Many modern writers, such as Winckel, Grundewaldt, and d'Espine, entirely deny the connection of this disturbance with lactation, and refer it to a slight and transient *septicæmia*. Graily Hewitt remarks that it is most commonly met with when the patient is kept low and on deficient diet after delivery, especially when the system is below par from hæmorrhage, or any other cause. This observation will, no doubt, account for the comparative rarity of febrile disturbance in connection with lactation in these days, in which the starving of puerperal patients is not considered necessary. It is certain that anything deserving the name of milk fever is now altogether exceptional, and such feverishness as exists is generally quite transient. It is also a fact, that it is most apt to occur in delicate and weakly women, especially in those who do not, or are unable to, nurse. There does not, however, seem to be any sufficient reason for referring it, even when tolerably well marked, to *septicæmia*. The relief which attends the emptying of the breasts seems sufficient to prove its connection with lactation, and the discomfort which is necessarily associated with the swollen and turgid mammæ, is, of itself, quite sufficient to explain it.

Immediately after delivery the uterus contracts firmly, and can be felt at the lower part of the abdomen as a hard, firm mass, about the size of a cricket-ball. After a time it again relaxes somewhat, and alternate relaxations and contractions go on, at intervals, for a considerable time after the expulsion of the placenta. The more complete and permanent the contraction, the greater the safety and comfort of the patient; for when the organ remains in a state of partial relaxation, coagula are apt to be retained in its cavity, while, for the same reason, air finds its way more readily into it. Hence decomposition is favoured, and the chances of septic absorption much increased; while, even when this does not occur, the muscular fibres are excited to contract, and severe after-pains are produced.

Contraction of the uterus after delivery.

After the first few days the diminution in the size of the uterus progresses with great rapidity. By about the sixth day it is so much lessened as to project not more than $1\frac{1}{2}$ or 2 inches above the pelvic brim, while by the eleventh day it is no

Subsequent diminution in the size of the uterus.

longer to be made out by abdominal palpation. Its increased size is, however, still quite apparent per vaginam, and, should occasion arise for making an internal examination, the mass of the lower segment of the uterus, with its flabby and patulous cervix, can be felt for some weeks after delivery. This may sometimes be of practical value in cases in which it is necessary to ascertain the fact of recent delivery, and, under these circumstances, as pointed out by Simpson, the uterine sound would also enable us to prove that the cavity of the uterus is considerably elongated. Indeed the normal condition of the uterus and cervix is not regained until six weeks or two months after labour. These observations are corroborated by investigations on the weight of the organ at different periods after labour. Thus Heschl¹ has shown that the uterus, immediately after delivery, weighs about 22 to 24 ozs.; within a week, it weighs 19 to 21 ozs.; and at the end of the second week, 10 to 11 ozs. only. At the end of the third week, it weighs 5 to 7 ozs.; but it is not until the end of the second month that it reaches its normal weight. Hence it appears that the most rapid diminution occurs during the second week after delivery.

Weight of
the organ
after de-
livery.

Fatty
transfor-
mation of
the muscu-
lar fibres.

The mode in which this diminution in size is effected is by the transformation of the enormously hypertrophied muscular fibres into molecular fat, which is absorbed into the maternal vascular system, which, therefore, becomes loaded with a large amount of effete material. Heschl has shown that the entire mass of the enlarged uterine muscles are removed, and replaced by newly-formed fibres, which commence to be developed about the fourth week after delivery, the change being complete about the end of the second month. Generally speaking, the process of involution goes on without interruption. It is, however, apt to be interfered with by a variety of causes, such as premature exertion, intercurrent disease, and, very probably, by neglect of lactation. Hence the uterus often remains large, bulky, and sub-involuted, and the foundation for many subsequent uterine ailments is laid.

Changes in
the uterine
mucous
membrane.

The changes going on in the lining membrane of the uterus immediately after delivery are of immense importance in leading to a knowledge of the puerperal state, and have

¹ *Researches on the Conduct of the Human Uterus after Delivery.*

already been discussed when describing the decidua (see vol. i. p. 89). Its cavity is covered with a reddish gray film, formed of blood and fibrine. The open mouths of the uterine sinuses are still visible, more especially over the site of the placenta, and thrombi may be seen projecting from them. The placental site can be very distinctly made out, in the form of an irregularly oval patch, where the lining membrane is thicker than elsewhere. The vagina soon contracts, and, by the time the puerperal month is over, it has returned to its normal dimensions, but after child-bearing it always remains more lax, and less rugous, than in nulliparæ. The vulva, at first very lax and much distended, soon regains its former state. The abdominal parietes remain loose and flabby for a considerable time, and the white streaks, produced by the distension of the cutis, very generally leave permanent marks. In some women, especially when proper support by bandaging has not been given, the abdomen remains permanently loose and pendulous.

Contraction of the vagina, &c.

From the time of delivery, up to about three weeks afterwards, a discharge escapes from the interior of the uterus, known as the *lochia*. At first this consists almost entirely of pure blood, mixed with a variable amount of coagula. If efficient uterine contraction have not been secured after the expulsion of the placenta, coagula of considerable size are frequently expelled with the lochia for one or two days after delivery. In three or four days the distinctly bloody character of the lochia is altered. They have a reddish watery appearance, and are known as the *lochia rubra* or *cruenta*. According to the researches of Wertheimer,¹ they are at this time composed chiefly of blood corpuscles, mixed with epithelium scales, mucous corpuscles, and the débris of the decidua. The change in the appearance of the discharge progresses gradually, and about the seventh or eighth day it has no longer a red colour, but is a pale greenish fluid, with a peculiar sickening and disagreeable odour, and is familiarly described as the 'green waters.' It now contains a smaller quantity of blood corpuscles, which lessen in amount from day to day, but a considerable number of pus corpuscles, which remain the principal constituent of the discharge until it ceases. Besides these, epithelial scales,

The lochial discharge.

¹ Virchow's *Arch.* 1861.

fatty granules, and crystals of cholesterine, are observed. Occasionally a small infusorium, which has been named the 'trichomena vaginalis,' has been detected; but it is not of constant occurrence.

Variation
in its
amount
and dura-
tion.

The amount of the lochia varies much, and in some women it is habitually more abundant than in others. Under ordinary circumstances it is very scanty after the first fortnight, but occasionally it continues somewhat abundant for a month or more, without any bad results. It is apt again to become of a red colour, and to increase in quantity, in consequence of any slight excitement or disturbance. If this red discharge continue for any undue length of time, there is reason to suspect some abnormality, and it may not unfrequently be traced to slight lacerations about the cervix, which have not healed properly. This result may also follow premature exertion, interfering with the proper involution of the uterus; and the patient should certainly not be allowed to move about as long as any amount of coloured discharge is going on.

Occasional
fætor of
the dis-
charge.

Occasionally the lochia have an intensely fætid odour. This symptom must always give rise to some anxiety, since it often indicates the retention and putrefaction of coagula, and involves the risk of septic absorption. It is not very rare, however, to observe a most disagreeable odour persist in the lochia without any bad results. The fætor always deserves careful attention, and an endeavour should be made to obviate it by directing the nurse to syringe out the vagina freely night and morning with Condy's fluid and water; while, if it be associated with quickened pulse and elevated temperature, other measures, to be subsequently described, will be necessary.

The after-
pains.

The *after-pains*, which many child-bearing women dread even more than the labour-pains, are irregular contractions, occurring for a varying time after delivery, and resulting from the efforts of the uterus to expel coagula which have formed in its interior. If, therefore, special care be taken to secure complete and permanent contraction after labour, they rarely occur, or to a very slight extent. Their dependence on uterine inertia is evidenced by the common observation that they are seldom met with in primiparæ, in whom uterine contraction may be supposed to be more efficient, and are

most frequent in women who have borne many children. They are a preventible complication, and one which need not in itself give rise to any anxiety; they are, indeed, rather salutary than the reverse, for if coagula be retained in utero, the sooner they are expelled the better. The after-pains generally begin a few hours after delivery, and continue, in bad cases, for three or four days, but seldom longer. When at their height they are often relieved by the expulsion of the coagula. They may be readily distinguished from pains due to more serious causes, by feeling the enlarged uterus harden under their influence, by the uterus not being tender on pressure, and by the absence of any constitutional symptoms.

The management of women after child-birth has varied much at different times, according to fashion or theory. The dread of inflammation long influenced the professional mind, and caused the adoption of a strictly anti-phlogistic diet, which led to a tardy convalescence. The recognition of the essentially physiological character of labour has resulted in more sound views, with manifest advantage to our patients. The main facts to bear in mind with regard to the puerperal woman are, her nervous susceptibility, which necessitates quiet and absence of all excitement; the importance of favouring involution by prolonged rest; and the risk of septicæmia, which calls for perfect cleanliness, and attention to hygienic precautions.

Management of women after delivery.

As soon as we are satisfied that the uterus is perfectly contracted, and that all risk of hæmorrhage is over, the patient should be left to sleep. Many practitioners administer an opiate; but, as a matter of routine, this is certainly not good practice, since it checks the contractions of the uterus, and often produces unpleasant effects. Still, if the labour have been long and tedious, and the patient be much exhausted, 15 or 20 drops of Battley's solution may be administered with advantage.

The administration of opiates is generally unadvisable.

Within a few hours the patient should be seen, and at this first visit particular attention should be paid to the states of the pulse, the uterus, and the bladder. The pulse during the whole period of convalescence should be carefully watched, and, if it be at all elevated, the temperature should at once be taken. If the pulse and temperature

Attention to the state of the pulse, bladder, and uterus.

remain normal, we may be satisfied that things are going on well; but if the one be quickened and the other elevated, some disturbance or complication may be apprehended. The abdomen should be felt to see that the uterus is not unduly distended, and that there is no tenderness. After the first day or two this is no longer necessary.

Treatment
of reten-
tion of
urine.

Sometimes the patient cannot at first void the urine, and the application of a hot sponge over the pubes may enable her to do so. If the retention of urine be due to temporary paralysis of the bladder, three or four 20-minim doses of the liquid extract of ergot, at intervals of half an hour, may prove successful. Many hours should not be allowed to elapse without relieving the patient by the catheter, since prolonged retention of urine is only likely to make matters worse. Subsequently, it may be necessary to empty the bladder night and morning, until the patient regain her power over it, or until the swelling of the urethra subsides, which will generally be the case in a few days. Occasionally the bladder is largely distended, and is relieved to some degree by dribbling of urine from the urethra. Such a state of things may deceive the patient and nurse, and may produce very serious consequences by causing cystitis. Attention to the condition of the abdomen will prevent the practitioner from being deceived, for in addition to some constitutional disturbance, a large, tender, and fluctuating swelling will be found in the hypogastric region, distinct from the uterus, which it displaces to one or other side. The catheter will at once prove that this is produced by distension of the bladder.

Treatment
of severe
after-
pains.

If the after-pains be very severe, an opiate may be administered, or, if the lochia be not overabundant, a linseed-meal poultice, sprinkled with laudanum, or with the chloroform and belladonna liniment, may be applied. If proper care have been taken to induce uterine contraction, they will seldom be sufficiently severe to require treatment. In America, quinine in doses of 10 grains twice daily, has been strongly recommended, especially when opiates fail, and when the pains are neuralgic in character, and I have found this remedy answer extremely well.

Diet and
regimen.

The diet of the puerperal patient claims careful attention, the more so as old prejudices in this respect are as yet far from exploded, and as it is by no means rare to find mothers

and nurses who still cling tenaciously to the idea that it is essential to prescribe a low regimen for many days after labour. The erroneousness of this plan is now so thoroughly recognised, that it is hardly necessary to argue the point. There is, however, a tendency in some to error in the opposite direction, which leads them to insist on the patient's consuming solid food too soon after delivery, before she has regained her appetite, thereby producing nausea and intestinal derangement. Our best guide in this matter are the feelings of the patient herself. If, as is often the case, she be disinclined to eat, there is no reason why she should be urged to do so. A good cup of beef-tea, some bread and milk, or an egg beat up with milk, may generally be given with advantage shortly after delivery, and many patients are not inclined to take more for the first day or so. If the patient be hungry there is no reason why she should not have some more solid, but easily digested food, such as white fish, chicken, or sweetbread; and, after a day or two, she may resume her ordinary diet, bearing in mind that, being confined to bed, she cannot with advantage consume the same amount of solid food as when she is up and about. Dr. Oldham, in his presidential address to the Obstetrical Society,¹ has some apposite remarks on this point, which are worthy of quotation. 'A puerperal month under the guidance of a monthly nurse is easily drawn out, and it is well if a love of the comforts of illness and the persuasion of being delicate, which are the infirmities of many women, do not induce a feeble life, which long survives after the occasion of it is forgotten. I know no reason why, if a woman is confined early in the morning, she should not have her breakfast of tea and toast at nine, her luncheon of some digestible meat at one, her cup of tea at five, her dinner with chicken at seven, and her tea again at nine, or the equivalent, according to the variation of her habits of living. Of course, there is the common sense selection of articles of food, guarding against excess, and avoiding stimulants. But gruel and slops, and all intermediate feeding, are to be avoided.' No one who has seen both methods adopted can fail to have been struck with the more rapid and satisfactory convalescence which takes place when the pa-

¹ *Obstet. Trans.* vol. vi.

tient's strength is not weakened by an unnecessarily low diet. Stimulants, as a rule, are not required; but, if the patient be weakly and exhausted, or if she be accustomed to their use, there can be no reasonable objection to their judicious administration.

Attention
to cleanliness,
&c.

Immediately after delivery a warm napkin is applied to the vulva, and, after the patient has rested a little, the nurse removes the soiled linen from the bed, and washes the external genitals. It is impossible to pay too much attention during the subsequent progress of the case to the maintenance of perfect cleanliness. The linen should be frequently changed, and all dirty linen and discharges immediately removed from the apartment. The vulva should be washed daily with Condyl's fluid and water, and the patient will derive great comfort from having the vagina syringed gently out once a day with the same solution. The room should be kept tolerably cool, and fresh air freely admitted.

Action of
the bowels.

It is customary, on the morning of the second or third day, to secure an action of the bowels; and there is no better way of doing this than by a large enema of soap and water. If the patient object to this, and the bowels have not acted, some mild aperient may be administered, such as a small dose of castor-oil, a few grains of colocynth and henbane pill, or the popular French aperient, the 'Tamar Indien.'

Lactation.

The management of suckling and of the breasts form an important part of the duties of the monthly nurse, which the practitioner should himself superintend. This will be more conveniently discussed under the head of lactation.

Importance of
prolonged
rest.

The most important part of the management of the puerperal state is the securing to the patient prolonged rest in the horizontal position, in order to favour proper involution of the uterus. For the first few days she should be kept as quiet and still as possible, not receiving the visits of any but her nearest relatives, thus avoiding all chance of undue excitement. It is customary among the better classes for the patient to remain in bed for eight or ten days; but, provided she be doing well, there can be no objection to her lying on the outside of the bed, or slipping on to a sofa, somewhat sooner. After ten days or a fortnight she may be permitted to sit on a chair for a little; but I am convinced that the longer she can be persuaded to retain the recumbent position, the

more complete and satisfactory will be the progress of involution, and she should not be allowed to walk about until the third week, about which time she may also be permitted to take a drive. If it be borne in mind that it takes from six weeks to two months for the uterus to regain its natural size, the reason for prolonged rest will be obvious. The judicious practitioner, however, while insisting on this point, will take measures, at the same time, not to allow the patient to lapse into the habits of an invalid, or to give the necessary rest the semblance of disease.

Towards the termination of the puerperal month some slight tonic, such as small doses of quinine with phosphoric acid, may often be given with advantage, especially if convalescence be tardy. Nothing is so beneficial in restoring the patient to her usual health as change of air, and in the upper classes a short visit to the seaside may generally be recommended, with the certainty of much benefit.

Subse-
quent
treatment.

CHAPTER II.

MANAGEMENT OF THE INFANT, LACTATION, ETC.

Com-
mencement
of respira-
tion after
the birth
of the
child.

ALMOST immediately after its expulsion a healthy child cries aloud, thereby showing that respiration is established, and this may be taken as a signal of its safety. The first respiratory movements are excited, partly by reflex action resulting from the contact of cold external air on the cutaneous nerves, and partly by the direct irritation of the medulla oblongata, in consequence of the circulation through it of blood no longer oxygenated in the placenta.

Apparent
death of
the new-
born child.

Not unfrequently the child is born in an apparently lifeless state. This is especially apt to be the case when the second stage of labour has been unduly prolonged, so that the head has been subjected to long-continued pressure. The utero-placental circulation is also apt to be injuriously interfered with before the birth of the child when a tardy labour has produced tonic contraction of the uterine fibres, and consequent closure of the uterine sinuses; or, more rarely, from such causes as the injudicious administration of ergot, premature separation of the placenta, or compression of the umbilical cord. In any of these cases it is probable that the arrest of the utero-placental circulation induces attempts at inspiration, which, however, are necessarily fruitless, since air cannot reach the lungs, and the foetus may die asphyxiated; the existence of the respiratory movement being proved on post-mortem examination by the presence in the lungs of liquor amnii, mucus and meconium, and by the extravasation of blood from the rupture of their engorged vessels.

Appear-
ance
of the
child in
such cases.

In most cases, when the child is born in a state of apparent asphyxia, its face is swollen and of a dark livid colour. It not unfrequently makes one or two feeble and gasping efforts at respiration, without any definite cry; on auscultation the heart may be heard to beat weakly and slowly. Under

such circumstances there is a fair hope of its recovery. In other cases the child, instead of being turgid and livid in the face, is pale, with flaccid limbs, and no appreciable cardiac action, when the prognosis is much more unfavourable.

No time should be lost in endeavouring to excite respiration, and, at first, this must be done by applying suitable stimulants to the cutaneous nerves, in the hope of exciting reflex action. The cord should be at once tied, so that the child may be removed from the mother; for the final uterine contractions have so completely arrested the utero-placental circulation, as to render it no longer of any value. If the face be very livid, a few drops of blood may with advantage be allowed to flow from the cord before it is tied, with the view of relieving the embarrassed circulation. Very often some slight stimulus, such as one or two sharp slaps on the thorax, or rapidly rubbing the body with brandy poured into the palms of the hands, will suffice to induce respiration. Failing this, nothing acts so well as the sudden and instantaneous application of heat and cold. For this purpose extremely hot water is placed in one basin, and quite cold water in another. Taking the child by the shoulders and legs, it should be dipped for a single moment into the hot water, and then into the cold; and these alternate applications may be repeated once or twice, as occasion requires. The effect of this measure is often very marked, and I have frequently seen it succeed when prolonged efforts at artificial respiration had been made in vain. If these means fail, an endeavour must be at once made to carry on respiration artificially, and we have various methods to choose from, the ones most generally used in this country being those of Marshall Hall and Sylvester. The Sylvester method is, on the whole, that which is most easily applied, and, on account of the compressibility of the thorax, it is peculiarly suitable for infants. The child being laid on its back, with the shoulders slightly elevated, the elbows are grasped by the operator, and alternately raised above the head, and then slowly depressed against the sides of the thorax, so as to produce the effect of inspiration and expiration. If this do not succeed, the Marshall Hall method may be substituted; and one or more

Treatment
of appa-
rent death.

Applica-
tion of
stimulants
to the
skin.

Artificial
respira-
tion.

Insufflation of the lungs.

of the plans of exciting reflex action through the cutaneous nerves may be alternated with it. Other means of exciting respiration have been recommended. One of them, much used abroad, is the artificial insufflation of the lungs by means of a flexible catheter guided into the glottis. It is not difficult to pass the end of a catheter into the glottis, using the little finger as a guide; and once in position, it may be used to blow air gently into the lungs, which is expelled by compression on the thorax, the insufflation being repeated at short intervals of about ten seconds. One advantage of this plan is, that it allows the liquor amnii and other fluids, which may have been drawn into the lungs in the premature efforts at respiration before birth, to be sucked up into the catheter, and so removed from the lungs. The same effect may be produced, but less perfectly, by placing the hand over the nostrils of the child, blowing into its mouth, and immediately afterwards compressing the thorax. One of these methods should certainly be tried, if all other means have failed. Faradisation along the course of the phrenic nerves is a promising means of inducing respiration, which should be used if the proper apparatus can be procured. Encouragement to persevere in our endeavours to resuscitate the child may be derived from the numerous authenticated instances of success after the lapse of a considerable time, even of an hour or more. As long as the cardiac pulsations continue, however feebly, there is no reason to despair.

Faradisation.

Washing and dressing of the child.

When the child cries lustily from the first, it is customary for the nurse to wash and dress it as soon as her immediate attendance on the mother is no longer required. For this purpose it is placed in a bath of warm water, and carefully soaped and sponged from head to foot. With the view of facilitating the removal of the unctuous material with which it is covered, it is usual to anoint it with cold cream or olive-oil, which is washed off in the bath. Nurses are apt to use undue roughness in endeavouring to remove every particle of the vernix caseosa, small portions of which are often firmly adherent. This mistake should be avoided, as these particles will soon dry up and become spontaneously detached. The cord is generally wrapped in a small piece of charred linen, which is supposed to have some slight antiseptic property, and this is

renewed from day to day until the cord has withered and separated, and this generally occurs within a week. Then a small pad of soft linen is placed over the umbilicus, and supported by a flannel belly-band, placed round the abdomen, which should not be too tight, for fear of embarrassing the respiration. By this means the tendency to umbilical hernia is prevented.

The clothing of the infant varies according to fashion and the circumstances of the parents. The important points to bear in mind are that it should be warm, (since newly-born children are extremely susceptible to cold), and at the same time light, and sufficiently loose to allow free play to the limbs and thorax. All tight bandaging and swaddling, such as is common in some parts of the Continent, should be avoided, and the clothes should be fastened by strings or by sewing, and no pins used. At the present day it is customary not to use caps, so that the head may be kept cool. The utmost possible attention should be paid to cleanliness, and the child should be regularly bathed in tepid water, at first once daily, and, after the first few weeks, both night and morning. After drying, the flexures of the thighs and arms, and the nates, should be dusted with violet powder or Fuller's earth, to prevent chafing of the skin. The excrements should be received in napkins wrapped round the hips, and great care is required to change the napkins as often as they are wet or soiled, otherwise troublesome irritation will arise. A neglect of this precaution, and the washing of the napkins with coarse soap or soda, are among the principal causes of the eruptions and excoriations so common in badly cared for children. When washed and dressed the child may be placed in its cradle, and covered with soft blankets or an eider-down quilt.

Clothing,
&c.

As soon as the mother has rested a little, it is advisable to place the child to the breast. This is useful to the mother by favouring uterine contraction. Even now there is in the breasts a variable quantity of the peculiar fluid known as *colostrum*. This is a viscid yellowish secretion, different in appearance from the thin bluish milk which is subsequently formed. Examined under the microscope it is found to contain some milk globules, a number of large granular corpuscles, and small fat corpuscles. It has a purgative

Applica-
tion of the
child to the
breast.

The colos-
trum and
its proper-
ties.

property, and soon produces a discharge of the meconium with which the bowels are loaded, and with less irritation than any of the laxatives so generally used. Hence the accoucheur should prohibit the common practice of administering castor oil, or other aperient, within the first few days after birth, although there can be no objection to it, in special cases, if the bowels appear to act inefficiently and with difficulty.

Over-frequent suckling should be avoided.

For the first few days, and until the secretion of milk is thoroughly established, the child should be put to the breast at long intervals only. Constant attempts at suckling an empty breast lead to nothing but disappointment, both to the mother and child, and, by unduly irritating the mammæ, sometimes to positive harm. Therefore, for the first day or two, it is sufficient if the child be applied to the breast twice, or at most three times, in the twenty-four hours. Nor is it necessary to be apprehensive, as many mothers naturally are, that the child will suffer from want of food. A few spoonfuls of milk and water may be given from time to time, but the child may generally wait without injury until the milk is secreted. This is generally about the third day, when the secretion is found to be a whitish fluid, more watery in appearance than cow's milk, and showing under the microscope an abundance of minute spherical globules, refracting light strongly, which are abundant in proportion to the quality of the milk. A certain number of granular corpuscles may also be observed shortly after the birth of the child, but, after the first month, these should have almost altogether disappeared. The reaction of human milk is decidedly alkaline, and the taste much sweeter than that of cow's milk.

Secretion of milk.

Importance of nursing when practicable.

The importance to the mother of nursing her own child, whenever her health permits, on account of the favourable influence of lactation in promoting a proper involution of the uterus, has already been insisted on. Unless there be some positive contra-indication, such as a marked strumous cachexia, or great general debility, it is the duty of the accoucheur to urge the mother to attempt lactation, even if it be not carried on more than a month or two. It is, however, the fact that in the upper classes of society a large number of patients are unable to nurse, even though willing and anxious.

to do so." In some there is hardly any lacteal secretion at all, in others there is at first an over-abundance of watery and unnutritious milk, which floods the breasts, and soon dies away altogether.

Whenever the mother cannot or will not nurse, the question will arise as to the method of bringing up the child. From many causes there is an increasing tendency to resort to bottle-feeding, instead of procuring the services of a wet nurse, even when the question of expense does not come into consideration. No long experience is required to prove that hand-feeding is a bad and imperfect substitute for nature's mode, and one which the practitioner should discourage whenever it lies in his power to do so. It is true that, in a large proportion of cases, bottle-fed children do well; but there is good reason to believe that, even when apparently most successful, the children are not so strong in after-life as they would have been had they been brought up at the breast. When, in addition, it is borne in mind how much of the success of hand-feeding depends on intelligent care on the part of the nurse, what evils are apt to accrue from injurious selection of food, and from ignorance of the commonest laws of dietetics, there is abundant reason for urging the substitution of a wet nurse, whenever the mother is unable to undertake the suckling of her child. It must be admitted that good hand-feeding is better than bad wet-nursing, and the success of the latter hinges on the proper selection of a wet nurse. As this falls within the duties of the practitioner, it will be well to point out the qualities which should be sought for in a wet nurse, before proceeding to discuss the mode of rearing the child at the breast.

When the mother cannot nurse, a wet nurse should be procured.

In selecting a wet nurse we should endeavour to choose a strong, healthy woman, who should not be over 30, or 35 years of age at the outside, since the quality of the milk deteriorates in women who are more advanced in life. For a similar reason a very young woman of 16 or 17 should be rejected. It is needless to say that care must be taken to ascertain the absence of all traces of constitutional disease, especially marks of scrofula, or enlarged cervical or inguinal glands, which may possibly be due to antecedent syphilitic taint. If the nurse be of good muscular development, healthy looking, with a clear com-

Selection of a wet nurse.

plexion, and sound teeth (indicating a generally good state of health), the colour of the hair and eyes are of secondary importance. It is commonly stated that brunettes make better nurses than blondes, but this is by no means necessarily the case; and, provided all the other points be favourable, fairness of skin and hair need be no bar to the selection of a nurse. The breasts should be pear-shaped, rather firm, as indicating an abundance of gland tissue, and with the superficial veins well marked. Large, flabby breasts owe much of their size to an undue deposit of fat, and are generally unfavourable. The nipple should be prominent, not too large, and free from cracks and erosions, which, if existing, might lead to subsequent difficulties in nursing. On pressing the breast the milk should flow from it easily in a number of small jets, and some of it should be preserved for examination. It should be of a bluish white colour, and of a somewhat watery appearance, and, when placed under the microscope, the field should be covered with an abundance of milk corpuscles, and the large granular corpuscles of the colostrum should have entirely disappeared. If the latter be observed in any quantity in a woman who has been confined five or six weeks, the inference is that the milk is inferior in quality. It is not often that the practitioner has an opportunity of enquiring into the moral qualities of the nurse, although much valuable information might be derived from a knowledge of her previous character. An irascible, excitable, or highly nervous woman will certainly make a bad nurse, and the most trivial causes might afterwards interfere with the quality of her milk. Particular attention should be paid to the nurse's own child, since its condition affords the best criterion of the quality of her milk. It should be plump, well nourished, and free from all blemishes. If it be at all thin and wizened, especially if there be any snuffling at the nose, the nurse should be unhesitatingly rejected.

Manage-
ment of
lactation.

The management of lactation is much the same whether the child is nursed by the mother or by a wet nurse. As soon as the supply of milk is sufficiently established, the child must be put to the breast at short intervals, at first of about two hours, and, in about a month or six weeks, of three hours. From the first few days it is a matter of the greatest

importance, both to the mother and child, to acquire regular habits in this respect. If, as is unfortunately so often the case, the mother get into the way of allowing the infant to take the breast whenever it cries, as a means of keeping it quiet, her own health must soon suffer, to say nothing of the discomfort of being incessantly tied to the child's side; while the child itself has not sufficient rest to digest its food, and, very shortly, diarrhœa or other symptoms of dyspepsia are pretty sure to follow. After a month or two the infant should be trained to require the breast less often at night, so as to enable the mother to have an undisturbed sleep of six or seven hours. For this purpose she should arrange the times of nursing so as to give the breast just before she goes to bed, and not again until the early morning. If the child should require food in the interval, a little milk and water, in the bottle, may be advantageously given.

The diet of the nursing woman should be arranged on ordinary principles of hygiene. It should be abundant, simple, and nutritious, and all rich and stimulating articles of food should be avoided. A common error in the diet of wet nurses is over-feeding, which constantly leads to deterioration of the milk. Many of these women, before entering on their functions, have been living on the simplest and even sparest diet, and not uncommonly, in the better class of houses, they are suddenly given heavy meat meals three and even four times a day, and often three or four glasses of stout. It is hardly a matter of astonishment that, under such circumstances, their milk should be found to disagree. For a nursing woman in good health two good meat meals a day, with two glasses of beer or porter, and as much milk and bread and butter as she likes to take in the interval, should be amply sufficient.

Diet of nursing women.

Plenty of moderate exercise should be taken, and the more nurse and child are out in the open air, provided the weather be reasonably fine, the better it is for both. Carried on methodically in this manner, wet nursing should give but little trouble. In the intervals between its meals the child sleeps most of its time, and wakes with regularity to feed; and, if the contrary be the case, if the child be wakeful, and restless, cry after feeding, have disordered bowels, and, above all, if it do not gain, week by week, in weight (a point

Signs of successful lactation.

which should be, from time to time, ascertained by the scales), we may conclude that there is either some grave defect in the management of lactation, or that the milk is not agreeing with the child. Should this unsatisfactory progress continue, in spite of our endeavours to remedy it, there is no resource left but the alteration of the diet, either by changing the nurse, or by bringing up the child by hand. The former should be preferred whenever it is practicable, and, in the upper ranks of life, it is by no means rare to have to change the wet nurse two or three times, before one is met with whose milk agrees perfectly with the child. If the child have reached six or seven months of age, it may be preferable to wean it altogether, especially if the mother have nursed it, as hand-feeding is much less objectionable if the infant have had the breast for even a few months.

Period of
weaning.

As a rule, weaning should not be attempted until dentition is fairly established, that being the sign that nature has prepared the child for an alteration of food; and it is better that the main portion of the diet should be breast milk until at least six or seven teeth have appeared. This is a safer guide than any arbitrary rule taken from the age of the child, since the commencement of dentition varies much in different cases. About the sixth or seventh month it is a good plan to commence the use of some suitable artificial food once a day, so as to relieve the strain on the mother or nurse, and prepare the child for weaning, which should always be a very gradual process. In this way a meal of rusks, of the entire wheat flour, or of beef- or chicken-tea, with bread crumb in it, may be given with advantage; and, as the period for weaning arrives, a second meal may be added, and so eventually the child may be weaned without distress to itself or trouble to the nurse.

The disorders of
lactation.

The disorders of lactation are numerous, and, as they frequently come under the notice of the practitioner, it is necessary to allude to some of the most common and important.

Means of
arresting
the secretion of
milk.

The advice of the accoucheur is often required in cases in which it has been determined that the patient is not to nurse, when we desire to get rid of the milk as soon as possible, or when, at the time of weaning, the same object is sought. The extreme heat and distension of the

breasts, in the former class of cases, often give rise to much distress. A smart saline aperient will aid in removing the milk, and for this purpose a double Seidlitz powder, or frequent small doses of sulphate of magnesia, act well; while, at the same time, the patient should be advised to take as small a quantity of fluid as possible. Iodide of potassium in large doses, of 20 or 25 grains, repeated twice or thrice, has a remarkable effect in arresting the secretion of milk. This observation was first empirically made by observing that the secretion of milk was arrested when this drug was administered for some other cause, and I have frequently found it answer remarkably well. The distension of the breasts is best relieved by covering them with a layer of lint or cotton wool, soaked in a spirit lotion, or eau de cologne and water, over which oiled silk is placed, and by directing the nurse to rub them gently with warm oil, whenever they get hard and lumpy. Breast-pumps and similar contrivances only irritate the breasts, and do more harm than good. The local application of belladonna has been strongly recommended as a means for preventing lacteal secretion. As usually applied, in the form of belladonna plaster, it is likely to do more harm than good, since the breast often enlarges after the plasters are applied, and the pressure of the unyielding leather on which they are spread produces intense suffering. A better way of using it is by rubbing down a drachm of the extract of belladonna with an ounce of glycerine, and applying this on lint. In some cases it answers extremely well; but it is very uncertain in its action, and frequently is quite useless.

A deficiency of milk in nursing mothers is a very common cause of difficulty. In a wet nurse this drawback is, of course, an indication for changing the nurse; but to the mother the importance of nursing is so great, that an endeavour must be made either to increase the flow of milk, or to supplement it by other food. Unfortunately, little reliance can be placed on any of the so-called galactagogues. The only one which in recent times has attracted attention is the leaves of the castor-oil plant, which, made into poultices and applied to the breast, are said to have a beneficial effect in increasing the flow of milk. More reliance must be placed in a sufficiency of nutritious food, especially such as contains phos-

Defective
secretion
of milk.

phatic elements; stewed eels; oysters; and other kinds of shell-fish, and the *Ravelenta Arabica*, are recommended by Dr. Routh, who has paid some attention to this point,¹ as peculiarly appropriate. If the amount of milk be decidedly deficient, the child should be less often applied to the breast, so as to allow milk to collect, and properly prepared cow's milk from a bottle should be given alternately with the breast. This mixed diet generally answers well, and is far preferable to pure hand-feeding.

Depressed
nipples.

A not uncommon source of difficulty is a depressed condition of the nipples, which is generally produced by the constant pressure of the stays. The result is, that the child, unable to grasp the nipple, and wearied with ineffectual efforts, may at last refuse the breast altogether. An endeavour should be made to elongate the nipple before putting it into the child's mouth, either by the fingers, or by some form of breast-pump, which here finds a useful indication. In the worst class of cases, when the nipple is permanently depressed, it may be necessary to let the child suck through a glass nipple-shield, to which is attached an india-rubber tube, similar to that of a sucking-bottle; this it is generally well able to do.

Fissures
and ex-
coriations
of the
nipples.

Fissures and excoriations of the nipples are common causes of suffering, in some cases leading to the formation of mammary abscess. Whenever the practitioner has the opportunity, he should advise his patient to prepare the nipple for nursing in the latter months of pregnancy, and this may best be done by daily bathing it with a spirituous or astringent lotion, such as eau de cologne and water, or a weak solution of tannin. After nursing has begun, great care should be taken to wash and dry the nipple after the child has been applied to it, and, as long as the mother is in the recumbent position, she may, if the nipples be at all tender, use zinc nipple-shields with advantage, when she is not nursing. In this way these troublesome complications may generally be prevented. The most common forms are either an abrasion on the surface of the nipple, which if neglected, may form a small ulcer, or a crack at some part of the nipple, most generally at its base. In either case, the suffering when the child is put to the breast is intense, sometimes

¹ Routh *On Infant Feeding*.

indeed amounting to intolerable anguish, causing the mother to look forward with dread to the application of the child; and, whenever such pain is complained of, the nipple should be carefully examined, since the fissure or sore is often so minute as to escape superficial examination. The remedies recommended are very numerous, and not always successful. Amongst those most commonly used are astringent applications, such as tannin, or weak solutions of nitrate of silver, or cauterising the edges of the fissure with the solid nitrate of silver, or applying the flexible collodion of the pharmacopœia. Dr. Wilson, of Glasgow, speaks highly of a lotion composed of ten grains of nitrate of lead in an ounce of glycerine, which is to be applied after sucking, the nipple being carefully washed before the child is put to the breast. I have myself found nothing answer so well as a lotion composed of half an ounce of sulphurous acid, half an ounce of the glycerine of tannin, and an ounce of water, the beneficial effects of which are sometimes quite remarkable. Relief may occasionally be obtained by inducing the child to suck through a nipple-shield, especially when there is only an excoriation; but this will not always answer, on account of the extreme pain which it produces.

An excessive flow of milk, known as *galactorrhœa*, often interferes with successful lactation. It is by no means rare in the first weeks after delivery in women of delicate constitution, who are really unfit to nurse, and who are flooded with a superabundance of watery and innutritious milk, which soon produces disordered digestion in the child. Under such circumstances, the only thing to be done is to give up an attempt which is injurious both to the mother and child. At a later stage the milk, secreted in large quantities, is sufficiently nourishing to the child, but the drain on the mother's constitution soon begins to tell on her. Palpitation, giddiness, emaciation, headache, loss of sleep, spots before the eyes, and even amaurosis, indicate the serious effects which are being produced, and the absolute necessity of at once stopping lactation. Whenever, therefore, a nursing woman suffers from such symptoms, it is far better at once to remove the cause, otherwise a very serious and permanent deterioration of health might result.

Excessive
flow of
milk.

There is no more troublesome complication of lactation

Mammary abscess.

than the formation of abscess in the breast; an occurrence by no means rare, and which, if improperly treated, may, by long-continued suppuration and the formation of numerous sinuses in and about the breast, produce very serious effects on the general health. The causes of breast abscess are numerous, and very trivial circumstances may occasionally set up inflammation, ending in suppuration. Thus it may follow exposure to cold; a blow, or other injury to the breast; some temporary engorgement of the lacteal tubes; or even sudden or depressing mental emotions. The most frequent cause is irritation from fissures or erosions of the nipples, which must, therefore, always be regarded with suspicion, and cured as soon as possible.

Signs and symptoms.

The abscess may form in any part of the breast, or in the areolar tissue below it; in the latter case, the inflammation very generally extends to the gland structure. Abscess is usually ushered in by constitutional symptoms, varying in severity with the amount and situation of the inflammation. Pyrexia is always present; elevated temperature, rapid pulse, and much malaise and sense of feverishness, followed, in many cases, by distinct rigor, when deep-seated suppuration is taking place. On examining the breast it will be found to be generally enlarged and very tender, while, at the site of the abscess, an indurated and painful swelling may be felt. If the inflammation be chiefly limited to the subglandular areolar tissue, there may be no localised swelling felt, but the whole breast will be acutely sensitive, and the slightest movement will cause much pain. As the case progresses, the abscess becomes more and more superficial, the skin covering it is red and glazed, and, if left to itself, it bursts. In the more serious cases, it is by no means rare for multiple abscesses to form. These opening, one after the other, lead to the formation of numerous fistulous tracts, by which the breast may become completely riddled. Sloughing of portions of the gland tissue may take place, and even considerable hæmorrhage, from the destruction of blood-vessels. The general health soon suffers to a marked degree, and, as the sinuses continue to suppurate for many successive months, it is by no means uncommon for the patient to be reduced to a state of profound and even dangerous debility.

Treatment.

Much may be done by proper care to prevent the forma-

tion of abscess, especially by removing engorgement of the lacteal ducts, when threatened, by gentle hand friction in the manner already indicated. When the general symptoms, and the local tenderness, indicate that inflammation has commenced, we should at once endeavour to moderate it, in the hope that resolution may occur without the formation of pus. Here general principles must be attended to, especially giving the affected part as much rest as possible. Feverishness may be combated by gentle salines, minute doses of aconite, and large doses of quinine; while pain should be relieved by opiates. The patient should be strictly confined to bed, and the affected breast supported by a suspensory bandage. Warmth and moisture are the best means of relieving the local pain, either in the form of hot fomentations, or of light poultices of linseed-meal or bread and milk, and the breast may be smeared with extract of belladonna rubbed down with glycerine, or the belladonna liniment sprinkled over the surface of the poultices. Generally the pain and irritation produced by putting the child to the breast are so great as to contra-indicate nursing from the affected side altogether, and we must trust to relieving the tension by poultices; lactation being, in the meantime, carried on by the other breast alone. In favourable cases this is quite possible for a time, and it may be that, if the inflammation do not end in suppuration, or if the abscess be small and localised, the affected breast is again able to resume its functions. Often this is not possible and it may be advisable, in severe cases, to give up nursing altogether.

The subsequent management of the case consists in the opening of the abscess as soon as the existence of pus is ascertained, either by fluctuation, or, if the site of the abscess be deep-seated, by the exploring needle. In the latter case rigors will confirm the suspicion of suppuration having occurred. It may be laid down as a principle, that the sooner the pus is evacuated the better, and nothing is to be gained by waiting until it is superficial. On the contrary, such delay only leads to more extensive disorganisation of tissue and the further spread of inflammation.

The method of opening the abscess is of primary importance. It has always been customary simply to open the abscess at its most depending part, without using any pre-

Pus should be removed as soon as possible.

Anti-
septic
treatment
of mam-
mary
abscess.

caution against the admission of air, and afterwards to treat secondary abscesses in the same way. The results are well known to all practical accoucheurs, and the records of surgery fully show how many weeks or months generally elapse in bad cases before recovery is complete. The antiseptic treatment of mammary abscess, in the way first pointed out by Lister, affords results which are of the most remarkable and satisfactory kind. Instead of being weeks and months in healing, I believe that the practitioner who fairly and minutely carries out Mr. Lister's directions may confidently look for complete healing of the abscess in a few days; and I know nothing, in the whole range of my professional experience, that has given me more satisfaction than the application of this method to abscesses of the breast. The plan I have used is that first recommended by Lister in the 'Lancet' for 1867, but which he has since greatly altered and improved. It is, however, easily within the reach of every one, and is so simple that no special skill or practice is required in its application; whereas the more perfected antiseptic appliances will probably not be so readily obtained, and are much more difficult to use. The method there described I have since adopted, without a single failure, in every case of breast abscess I have met with. In order that the full advantages of the antiseptic plan may be experienced, it is necessary that it should be carried out with minute attention to details, and therefore, at the risk of making a somewhat lengthy quotation, I copy Lister's own original directions:—'A solution of one part of crystallised carbolic acid in four parts of boiled linseed-oil having been prepared, a piece of rag from four to six inches square is dipped into the oily mixture, and laid upon the skin where the incision is to be made. The lower edge of the rag being then raised, while the upper edge is kept from slipping by an assistant, a common scalpel or bistoury dipped in the oil is plunged into the cavity of the abscess, and an opening about three-quarters of an inch in length is made, and the instant the knife is withdrawn the rag is dropped upon the skin as an antiseptic curtain, beneath which the pus flows out into a vessel placed to receive it. The cavity of the abscess is firmly pressed, so as to force out all existing pus as nearly as may be (the old fear of doing mischief by rough treatment of the pyogenic membrane being

quite ill-founded); and if there be much oozing of blood, or if there be considerable thickness of parts between the abscess and the surface, a piece of lint dipped in the antiseptic oil is introduced into the incision to check bleeding and prevent primary adhesion, which is otherwise very apt to occur. The introduction of the lint is effected as rapidly as may be, and under the protection of the antiseptic rag. Thus the evacuation of the original contents is accomplished with perfect security against the introduction of living germs. This, however, would be of no avail unless an antiseptic dressing could be applied that would effectually prevent the decomposition of the stream of pus constantly flowing out beneath it. After numerous disappointments, I have succeeded with the following, which may be relied upon as absolutely trustworthy:—About six tea-spoonfuls of the above-mentioned solution of carbolic acid in linseed-oil are mixed up with common whitening (carbonate of lime) to the consistence of a firm paste, which is, in fact, glazier's putty with the addition of a little carbolic acid. This is spread upon a piece of common tin-foil about six inches square, so as to form a layer about a quarter of an inch thick. The tin-foil, thus spread with putty, is placed upon the skin, so that the middle of it corresponds to the position of the incision, the antiseptic rag used in opening the abscess being removed the instant before. The tin is then fixed securely by adhesive plaster, the lowest edge being left free for the escape of the discharge into a folded towel placed over it and secured by a bandage. The dressing is changed, as a general rule, once in twenty-four hours, but, if the abscess be a very large one, it is prudent to see the patient twelve hours after it has been opened, when, if the towel should be much stained with discharge, the dressing should be changed, to avoid subjecting its antiseptic virtues to too severe a test. But after the first twenty-four hours a single daily dressing is sufficient. The changing of the dressing must be methodically done, as follows:—A second similar piece of tin-foil having been spread with the putty, a piece of rag is dipped in the oily solution and placed on the incision the moment the first tin is removed. This guards against the possibility of mischief occurring during the cleansing of the skin with a dry cloth, and pressing out any discharge which may exist

in the cavity. If a plug of lint was introduced when the abscess was opened, it is removed under cover of the antiseptic rag, which is taken off at the moment when the new tin is to be applied. The same process is continued daily until the sinus closes.'

Treatment
of long-
continued
suppura-
tion and
fever.

If the antiseptic plan be not used, or if the case come under our care when the abscess has been long discharging, or when sinuses have formed, the treatment is directed mainly to procuring a cessation of suppuration and closure of the sinuses. For this purpose methodical strapping of the breast with adhesive plaster, so as to afford steady support and compress the opposing pyogenic surfaces, will give the best results. It may be necessary to lay open some of the sinuses, or to inject tinct. iodi. or other stimulating lotions, so as to moderate the discharge, the subsequent surgical treatment varying according to the requirements of each individual case. As the drain on the system is great, and the constitutional debility generally pronounced, much attention must be paid to general treatment; and abundance of nourishing diet, appropriate stimulants, and such medicines as iron and quinine, will be indicated.

Hand-
feeding.

In a considerable number of cases the inability of the mother to nurse the child, her invincible repugnance to a wet nurse, or inability to bear the expense, render hand-feeding essential. It is, therefore, of importance that the accoucheur should be thoroughly familiar with the best method of bringing up the child by hand, so as to be able to direct the process in the way that is most likely to be successful.

Causes of
mortality
in hand-
fed chil-
dren.

Much of the mortality following hand-feeding may be traced to the administration of unsuitable articles of food. Among the poorer classes especially there is a prevalent notion that milk alone is insufficient; and hence the almost universal custom of administering various farinaceous foods, such as corn-flour or arrowroot, even from the earliest period. Many of these consist of starch alone, and are therefore absolutely unsuited for forming the staple of diet, on account of the total absence of nitrogenous elements. Independently of this, it has been shown that the saliva of infants has not the same digestive property on starch that it subsequently acquires, which affords a further explanation of its

so constantly producing intestinal derangement. Reason, as well as experience, abundantly prove that the object to be aimed at in hand-feeding is to imitate as nearly as possible the food which nature supplies for the new-born child, and therefore the obvious course is to use milk from some animal, so treated as to make it resemble human milk as nearly as may be.

Milk alone should be used at first.

Of the various milks used, that of the ass, on the whole, most closely resembles human milk, containing less casein and butter, and more saline ingredients. It is not always easy to obtain, and in towns is excessively expensive. Moreover, it certainly does not always agree with the child, and is apt to produce diarrhœa. We can, however, be more certain of its being unadulterated, which in large cities is in itself no small advantage, and it may be given without the addition of water or sugar.

Ass's milk.

Goat's milk in this country is still more difficult to obtain, but it often succeeds admirably. In many places the infant sucks the teat directly, and certainly thrives well on the plan.

Goat's milk.

In a large majority of cases we have to rely on cow's milk alone. It differs from human milk in containing less water, a larger amount of casein and solid matters, and less sugar. Therefore, in order to prepare it for administration, it requires to be diluted and sweetened. A common mistake is over-dilution, and it is far from rare for nurses to administer one-third cow's milk to two-thirds water. The result of this excessive dilution is, that the child becomes pale and puny, and has none of the firm and plump appearance of a well-fed infant. The practitioner should, therefore, ascertain that this mistake is not being made; and the necessary dilution will be best obtained by administering two-thirds pure fresh cow's milk, to which one-third hot water has been added, so as to warm the mixture to about 96°, the whole being slightly sweetened with sugar of milk, or ordinary crystallised sugar. After the first two or three months the amount of water may be lessened, and pure milk, warmed and sweetened, given instead. Whenever it is possible, the milk should be obtained from the same cow, and in towns some care is requisite to see that the animal is properly fed and stabled. Of late years it has been

Cow's milk and its preparation.

customary to obviate the difficulties of obtaining good fresh milk by using some of the tinned milks now so easily to be had. These are already sweetened, and sometimes answer well, if not given in too weak a dilution. One great fault in bottle-feeding is the tendency of the milk to become acid, and hence to produce diarrhoea. This may to a great extent be obviated by adding a tablespoonful of lime-water to each bottle, instead of an equal quantity of water.

Method of
hand-feed-
ing.

Much of the success of bottle-feeding must depend on minute care and scrupulous cleanliness, points which cannot be too strongly insisted on. Particular attention should be paid to preparing the food fresh for every meal, and to keeping the feeding-bottle and tubes constantly in water when not in use, so that minute particles of milk may not remain about them and become sour. A neglect of this is one of the most fertile sources of the thrush from which bottle-fed infants often suffer. Subject to these precautions, the particular form of bottle used is not of much consequence. Those now commonly employed, with a long india-rubber tube attached, are preferable to the older forms of flat bottle, as requiring more effort at suction on the part of the infant, and thus forcing it to swallow the food more slowly. Care must be taken to give the meals at stated intervals, as in breast-feeding, and these should be at first about two hours apart, the period being gradually extended. The nurse should be strictly cautioned against the common practice of placing the bottle beside the infant in its cradle, and allowing it to suck to repletion, a practice which certainly leads to over-distension of the stomach, and consequent dyspepsia. The child should be raised in the arms at the proper time, have its food administered, and then be replaced in the cradle to sleep. In the first few weeks of bottle-feeding constipation is very common, and this may be easily and effectually remedied by placing as much phosphate of soda as will lie on a threepenny-piece in the bottle, two or three times in the twenty-four hours.

Other
kinds of
food.

If this system succeed, no other food should be given until the child is six or seven months old, and then some of the various infant's foods may be cautiously commenced. Of these there are an immense number in common use; some of which are good articles of diet, others are physiologically unfitted

for infants. In selecting these foods we have to see that they contain the essential elements of nutrition in proper combination. All those, therefore, that are purely starchy in character, such as arrowroot, corn-flour, and the like, should be avoided; while those that contain nitrogenous as well as starchy elements, may be safely given. Of the latter the entire wheat flour, which contains the husks ground down with the wheat, generally answers admirably; and of the same character are rusks, tops and bottoms, Leibig's infant's food, and many others. If the child be pale and flabby, some more purely animal food may often be given once a day, and great benefit may be derived from a single meal of beef, chicken, or veal tea, with a little bread crumb in it, especially after the sixth or seventh month. Milk, however, should still form the main article of diet, and should continue to do so for many months.

If the child be pale, flabby, and do not gain flesh, more especially if diarrhoea or other intestinal disturbance be present, we may be certain that the attempt at hand-feeding is not answering satisfactorily, and that some change is required. If the child be not too old, and will still take the breast, that is certainly the best remedy; but, if that be not possible, it is necessary to alter the system of diet. When milk disagrees, cream, in the proportion of one tablespoonful to three of water, sometimes answers well. Occasionally also Leibig's infant's food, when carefully prepared, renders good service. Too often, however, when once diarrhoea or other intestinal disturbance has set in, all our efforts may prove unavailing, and the health, if not the life, of the infant becomes seriously imperilled. It is not, however, within the scope of this work to treat of the disorders of infants at the breast, the proper consideration of which requires a large amount of space, and I, therefore, refrain from making any further remarks on the subject.

Management when
milk disagrees.

CHAPTER III.

PUERPERAL ECLAMPSIA.

Puerperal
eclampsia.

By the term *puerperal eclampsia* is meant a peculiar kind of epileptiform convulsions, which may occur in the latter months of pregnancy, or during, or after parturition, and which constitutes one of the most formidable diseases with which the obstetrician has to cope. The attack is often so sudden and unexpected, so terrible in its nature, and attended with such serious danger both to the mother and child, that it has naturally attracted much attention.

Its doubtful
etiology.

The researches of Lever, Braun, Ferichs, and many other writers who have shown the frequent association of eclampsia with albuminuria, have, of late years, been supposed to clear up to a great extent the etiology of this disease, and to prove its dependence on the retention of urinary elements in the blood. While the urinary origin of eclampsia has been pretty generally accepted, more recent observations have tended to throw some doubt on its essential dependence on this cause; so that it can hardly be said that we are yet in a position to explain its true pathology with certainty. These points will require separate discussion, but it is first necessary to describe the character and history of the attack.

Confusion
from in-
cluding
distinct
diseases
under the
same
name.

Considerable confusion exists in the description of puerperal convulsions from the confounding of several essentially distinct diseases under the same name. Thus, in most obstetric works, it has been customary to describe three distinct classes of convulsion: the *epileptic*, the *hysterical*, and the *apoplectic*. The two latter, however, come under a totally different category. A pregnant woman may suffer from hysterical paroxysms, or she may be attacked with apoplexy, accompanied with coma, and followed by paralysis. But these conditions in the pregnant or parturient woman

are identical with the same diseases in the non-pregnant, and are in no way special in their nature. True eclampsia, however, is different in its clinical history from epilepsy; although the paroxysms, while they last, are essentially the same as those of an ordinary epileptic fit.

An attack of eclampsia seldom occurs without having been preceded by certain more or less well-marked precursory symptoms. It is true that, in a considerable number of cases, these are so slight as not to attract attention, and suspicion is not aroused until the patient is seized with convulsions. Still, subsequent investigations will very generally show that some symptoms did exist, which, if observed and properly interpreted, might have put the practitioner on his guard, and possibly enabled him to ward off the attack. Hence a knowledge of them is of real practical value. The most common are those associated with the cerebrum, such as severe headache, which is the one most generally observed, and is sometimes limited to one side of the head. Transient attacks of dizziness, spots before the eyes, loss of sight, or impairment of the intellectual faculties, are also not uncommon. These signs in a pregnant woman are of the gravest import, and should at once call for investigation into the nature of the case. Less marked indications sometimes exist in the form of irritability, slight headache or stupor, and a general feeling of indisposition. Another important premonitory sign is œdema of the subcutaneous cellular tissue, especially of the face or upper extremities, which should at once lead to a careful examination of the urine.

Premonitory symptoms.

Whether such indications have preceded an attack or not, as soon as the convulsion comes on there can no longer be any doubt as to the nature of the case. The attack is generally sudden in its onset, and in its character is precisely that of a severe epileptic fit, or of the convulsions in children. Close observation shows that there is at first a short period of tonic spasm, affecting the entire muscular system. This is almost immediately succeeded by violent clonic contractions, generally commencing in the muscles of the face, which twitch violently; the expression is horribly altered; the globes of the eyes are turned up under the eyelids, so as to leave only the white sclerotics visible, and the angles of the mouth are retracted and fixed in a convulsive grin. The tongue is at the

Symptoms of the attack.

There is first a tonic convulsion, almost immediately succeeded by clonic spasms.

same time protruded forcibly, and, if care be not taken, is apt to be lacerated by the violent grinding of the teeth. The face, at first pale, soon becomes livid and cyanosed, while the veins of the neck are distended, and the carotids beat vigorously. Frothy saliva collects about the mouth, and the whole appearance is so changed as to render the patient quite unrecognisable. The convulsive movements soon attack the muscles of the body. The hands and arms, at first rigidly fixed, with the thumbs clenched into the palms, also begin to jerk, and the whole muscular system is thrown into rapidly-recurring convulsive spasms. It is evident that the involuntary muscles are implicated in the convulsive action, as well as in the voluntary. This is shown by a temporary arrest of respiration at the commencement of the attack, followed by irregular and hurried respiratory movements, producing a peculiar hissing sound. The occasional involuntary expulsion of urine and fæces indicate the same fact. During the attack the patient is absolutely unconscious, sensibility is totally suspended, and she has afterwards no recollection of what has taken place. Fortunately the convulsion is not of long duration, and, at the outside, does not last more than three or four minutes, generally not so long. In most cases, however, after an interval, there is a recurrence of the convulsion, characterised by the same phenomena, and these paroxysms are repeated with more or less force and frequency according to the severity of the attack. Sometimes several hours may elapse before a second convulsion comes on; at others the attacks may recur very often, with only a few minutes between them. In the slighter forms of eclampsia there may not be more than 2 or 3 paroxysms in all; in the more serious as many as 50 or 60 have been recorded.

The
paroxysms
recur with
varying
frequency.

Condition
between
the
attacks.

After the first attack the patient generally soon recovers her consciousness, being somewhat dazed and somnolent, with no clear perception of what has occurred. If the paroxysms be frequently repeated, more or less profound coma continues in the intervals between them, which, no doubt, depends upon intense cerebral congestion, resulting from the interference with the circulation in the great veins of the neck, produced by spasmodic contraction of the muscles. The coma is rarely complete, the patient showing

signs of sensibility when irritated, and groaning during the uterine contractions. In the worst class of cases, the torpor may become intense and continuous, and in this state the patient may die. When the convulsions have entirely stopped, and the patient has completely regained her consciousness, and is apparently convalescent, recollection of what has taken place during, and some time before, the attack, may be entirely lost, and this condition may last for a considerable time. A curious instance of this once came under my notice in a lady who had lost a brother, to whom she was greatly attached, in the week immediately preceding her confinement, and in whom the mental distress seemed to have had a good deal to do in determining the attack. It was many weeks before she recovered her memory, and during that time she recollected nothing about the circumstances connected with her brother's death, the whole of that week being, as it were, blotted out of her recollection.

If the convulsions come on during pregnancy, we may look upon the advent of labour ~~as almost a certainty~~; and if we consider the severe nervous shock and general disturbance, this is the result we might reasonably anticipate. If they occur, as is not uncommon, for the first time during labour, the pains generally continue with increased force and frequency, since the uterus partakes of the convulsive action, as well as the other muscles of the body. It has not rarely happened that the pains have gone on with such intensity that the child has been born quite unexpectedly, while the attention of the practitioner has been taken up with the patient. In many cases the advent of fresh paroxysms is associated with the commencement of a pain, the irritation of which seems sufficient to bring on the convulsion.

Relation of
the attacks
to labour.

The results of eclampsia vary according to the severity of the paroxysms. It is generally said that about 1 in 3 or 4 cases dies. The mortality has certainly lessened of late years, probably in consequence of improved knowledge of the nature of the disease, and more rational modes of treatment. This is well shown by Barker,¹ who found in 1855 a mortality of 32 per cent. in cases occurring before and during labour, and 22 per cent. in those after labour; while since that date the mortality has fallen to

Results to
the mother
and child.

¹ *The Puerperal Diseases*, p. 125.

Cause of
death.

14 per cent. The same conclusion is arrived at by Dr. Phillips,¹ who has shown that the mortality has greatly lessened since the practice of repeated and indiscriminate bleeding, long considered the sheet anchor in the disease, has been discontinued, and the administration of chloroform substituted. Death may actually occur during the paroxysm, and then it may be due to the long continuance of the tonic spasm producing asphyxia. It is certain that, as long as the tonic spasm lasts, the respiration is suspended, just as in the convulsive disease of children known as laryngismus stridulus, and it is possible also that the heart itself may share in the convulsive contraction which is known to affect other involuntary muscles. More frequently, death happens at a later period, from the combined effects of exhaustion and asphyxia. The records of post-mortem examinations are not numerous; in those we possess the principal changes have been an anæmic condition of the brain, with some œdematous infiltration. In a few rare cases the convulsions have resulted in effusion of blood into the ventricles, or on the base of the brain. The prognosis as regards the child is also serious. Out of 36 children, Hall Davis found 26 born alive, 10 being still-born. There is good reason to believe that the convulsion* may attack the child in utero; of this several examples are mentioned by Cazeaux; or it may be subsequently attacked with convulsions, even when apparently healthy at birth.

Pathology
of the
disease.

The precise pathology of eclampsia cannot be considered by any means satisfactorily settled. When, in the year 1843, Lever first showed that the urine in patients suffering from puerperal convulsions was generally highly charged with albumen—a fact which subsequent experience has amply confirmed—it was thought that a key to the etiology of the disease had been found. It was known that chronic forms of Bright's disease were frequently associated with retention of urinary elements in the blood, and not rarely accompanied by convulsions. The natural inference was drawn, that the convulsions of eclampsia were also due to toxæmia resulting from the retention of urea in the blood, just as in the uræmia of chronic Bright's disease; and this view was

Uræmic
theory of
its origin.

¹ *Guy's Hosp. Rep.* 1870.

adopted and supported by the authority of Braun, Frerichs, and many other writers of eminence, and was pretty generally received as a satisfactory explanation of the facts. Frerichs modified it so far, that he held that the true toxic element was not urea as such, but carbonate of ammonia, resulting from its decomposition; and experiments were made to prove that the injection of this substance into the veins of the lower animals produced convulsions of precisely the same character as eclampsia. Dr. Hammond,¹ of Maryland, subsequently made a series of counter experiments, which were held as proving that there was no reason to believe that urea ever did become decomposed in the blood in the way that Frerichs supposed, or that the symptoms of uræmia were ever produced in this way. Spiegelberg² has, more recently, again examined the question both clinically, in a patient suffering from convulsions, in whose blood an excess of ammonia and urea was found, and by experiments in dogs, and maintains the accuracy of Frerichs' views. Others have believed that the poisonous elements retained in the blood are not urea or the products of its decomposition, but other extractive matters which have escaped detection. As time elapsed, evidence accumulated to show that the relation between albuminuria and eclampsia was not so universal as was supposed, or at least that some other factors were necessary to explain many of the cases. Numerous cases were observed in which albumen was detected in large quantities, without any convulsion following, and that, not only in women who had been the subject of Bright's disease before conception, but also when the albuminuria was known to have developed during pregnancy. Thus Imbert Goubeyre found that out of 164 cases of the latter kind, 95 had no eclampsia; and Blot, out of 41 cases, found that 34 were delivered without untoward symptoms. It may be taken as proved, therefore, that albuminuria is by no means necessarily accompanied by eclampsia. Cases also were observed in which the albumen only appeared after the convulsion; and in these it was evident that the retention of urinary elements could not have been the cause of the attack; and it is highly probable that in them the albuminuria was

Some cases, however, cannot be explained in this way.

Cases in which the convulsions preceded the albuminuria.

¹ *Amer. Journ.* 1861.

² *Arch. of Genk.* 1870.

produced by the same cause which induced the convulsion. Special attention has been called to this class of cases by Braxton Hicks,¹ who has recorded a considerable number of them. He says that the nearly simultaneous appearance of albuminuria and convulsion—and it is admitted that the two are almost invariably combined—must then be explained in one of three ways.

1st. That the convulsions are the cause of the nephritis.

2ndly. That the convulsions and the nephritis are, produced by the same cause, e.g. some detrimental ingredient circulating in the blood, irritating both the cerebro-spinal system and other organs at the same time.

3rdly. That the highly congested state of the venous system, induced by the spasm of the glottis in eclampsia, is able to produce the kidney complication.

Theory of
Traube
and Rosen-
stein.

More recently Traube and Rosenstein have advanced a theory of eclampsia purporting to explain these anomalies. They refer the occurrence of eclampsia to acute cerebral anæmia, resulting from changes in the blood incident to pregnancy. The primary factor in this is the hydræmic condition of the blood, which is an ordinary concomitant of the pregnant state, and, of course, when there is also albuminuria, the watery condition of the blood is greatly intensified; hence the frequent association of the two states. Accompanying this condition of the blood, there is increased tension of the arterial system, which is favoured by the hypertrophy of the heart which is known to be a normal occurrence in pregnancy. The result of these combined states is a temporary hyperæmia of the brain, which is rapidly succeeded by serous effusion into the cerebral tissues, resulting in pressure on its minute vessels, and consequent anæmia. There is much in this theory that accords with the most recent views as to the etiology of convulsive disease; as, for example, the researches of Kussmaul and Tenner, who have experimentally proved the dependence of convulsion on cerebral anæmia, and of Brown-Séquard, who showed that an anæmic condition of the nerve centres preceded an epileptic attack. It explains also very satisfactorily how the occurrence of labour should intensify the convulsions, since, during the acme of the pains, the tension of the cerebral arterial system is

¹ *Obst. Trans.* vol. viii.

necessarily greatly increased. There are, however, obvious difficulties against its general acceptance. For example, it does not satisfactorily account for those cases which are preceded by well-marked precursory symptoms, and in which an abundance of albumen is present in the urine. Here the premonitory signs are precisely those which precede the development of uræmia in chronic Bright's disease, the dependence of which on the retention in the blood of urinary elements can hardly be doubted.

The key to the liability of the puerperal woman to convulsive attacks is, no doubt, to be found in the peculiar excitable condition of the nervous system in pregnancy—a fact which was clearly pointed out by the late Dr. Tyler Smith, and by many other writers. Her nervous system is, in this respect, not unlike that of children, in whom the predominant influence and great excitability of the nervous system is a well-established fact, and in whom precisely similar convulsive seizures are of common occurrence on the application of a sufficiently exciting cause.

Excitability of nervous system in puerperal women as predisposing to convulsions.

Admitting this, we require some cause to set the predisposed nervous system into morbid action; and this we may have either in a toxæmic, or in an extremely watery, condition of the blood, associated with albuminuria; or along with these, or sometimes independently of them, in some excitement, such as strong emotional disturbance. It is highly probable, however, that the theory of Traube affords a true insight into the actual condition of the nerve centres—a fact of much practical importance in reference to treatment.

Exciting causes.

The management of cases in which the occurrence of suspicious symptoms has led to the detection of albuminuria, has already been fully discussed (vol. i. p. 224). We shall, therefore, here only consider the treatment of cases in which convulsions have actually occurred.

Treatment.

Until quite recently venesection was regarded as the sheet anchor in the treatment, and blood was always removed copiously, and, there is sufficient reason to believe, with occasional remarkable benefit. Many cases are recorded in which a patient, in apparently profound coma, rapidly regained her consciousness when blood was extracted in sufficient quantity. The improvement, however, was often

Venesection.

Theoretical objections to venesection.

transient, the convulsions subsequently recurring with increased vigour. There are good theoretical grounds for believing that blood-letting can only be of merely temporary use, and may even increase the tendency to convulsion. These are so well put by Schröder, that I cannot do better than quote his observations on this point :—‘ If,’ he says, ‘ the theory of Traube and Rosenstein be correct, a sudden depletion of the vascular system, by which the pressure is diminished, must stop the attacks. From experience it is known that after venesection the quantity of blood soon becomes the same through the serum taken from all the tissues, while the quality is greatly deteriorated by the abstraction of blood. A short time after venesection we shall expect to find the former blood-pressure in the arterial system, but the blood far more watery than previously. From this theoretical consideration it follows that abstraction of blood, if the above-mentioned conditions really cause convulsions, must be attended by an immediate favourable result, and, under certain circumstances, the whole disease may surely be cut short by it. But, if all other conditions remain the same, the blood-pressure will after some time again reach its former height. The quantity of blood has, in the meantime, been greatly deteriorated, and consequently the danger of the disease will be increased.’

In properly selected cases venesection is a valuable remedy.

These views sufficiently well explain the varying opinions held with regard to this remedy, and enable us to understand why, while the effects of venesection have been so lauded by certain authors, the mortality has admittedly been much lessened since its indiscriminate use has been abandoned. It does not follow* because a remedy, when carried to excess, is apt to be hurtful, that it should be discarded altogether; and I have no doubt that, in properly-selected cases, and judiciously employed, venesection is a valuable aid in the treatment of eclampsia, and that it is specially likely to be useful in mitigating the first violence of the attack, and in giving time for other remedies to come into action. Care should, however, be taken to select the cases properly, and it will be specially indicated when there is marked evidence of great cerebral congestion and vascular tension, such as a livid face, a full bounding pulse, and strong pulsation in the carotids. The general constitution of the

patient may also serve as a guide in determining its use, and we shall be the more disposed to resort to it, if the patient be a strong and healthy woman; while on the other hand, if she be feeble and weak, we may wisely 'discard it, and trust entirely to other means. In any case, it must be looked upon as a temporary expedient only; useful in warding off immediate danger to the cerebral tissues, but never as the main agent in treatment. Nor can it be permissible to bleed in the heroic manner frequently recommended. A single bleeding, the amount regulated by the effect produced, is all that is ever likely to be of service.

As a temporary expedient, having the same object in view, the compression of the carotids during the paroxysm is worthy of trial. This was proposed by Trousseau in the eclampsia of infants, but I am not aware but that it has been tried in puerperal convulsions. It is a simple measure, and it offers the advantage of not leading to any permanent deterioration of the blood, as in venesection.

Compression of the carotids.

As a subsidiary means of diminishing vascular tension the administration of a strong purgative is desirable, and has the further effect of removing any irritant matter that may be lodged in the intestinal tract. If the patient be conscious a full dose of the compound jalap powder may be given, or a few grains of calomel combined with jalap; and if she be comatose, and unable to swallow, a drop of croton-oil, or a quarter of a grain of elaterium, may be placed on the back of the tongue.

Administration of purgatives.

The great indication in the management of eclampsia is the controlling of convulsive action by means of sedatives. Foremost amongst them must be placed the inhalation of chloroform, a remedy which is frequently remarkably useful, and which has the advantage of being applicable at all stages of the disease, and whether the patient be comatose or not. Theoretical objections have been raised against its employment, as being likely to increase cerebral congestion, of which there is no satisfactory proof; on the contrary, there is reason to think that chloroform inhalation has rather the effect of lessening arterial tension, while it certainly controls the violent muscular action by which the vascular hyperæmia is so much increased. Practically no one who has used it can doubt its great value in diminishing the force and frequency

Administration of sedatives and narcotics.

Mode of
adminis-
tering
chloro-
form.

Chloral
and bro-
mide of
potassium.

Sub-cuta-
neous in-
jection of
morphia.

Rationale
of these
remedies.

of the convulsive paroxysms. Statistically its usefulness is shown by Charpentier, in his thesis on the effects of various methods of treatment in eclampsia, since out of 63 cases in which it was used, in 48 it had the effect of diminishing or arresting the attacks, 1 only proving fatal. The mode of administration has varied. Some have given it almost continuously, keeping the patient in a more or less profound state of anæsthesia. Others have contented themselves with carefully watching the patient, and exhibiting the chloroform as soon as there were any indications of a recurring paroxysm, with the view of controlling its intensity. The latter is the plan I have myself adopted, and of the value of which, in most cases, I have no doubt. Every now and again, cases will occur in which chloroform inhalation is insufficient to control the paroxysm, or in which, from the very cyanosed state of the patient, its administration seems contra-indicated. Moreover, it is advisable to have, if possible, some remedy more continuous in its action, and requiring less constant personal supervision. Latterly the internal administration of chloral has been recommended for this purpose. My own experience is decidedly in its favour, and I have used, as I believe, with marked advantage a combination of chloral with bromide of potassium, in the proportion of twenty grains of the former to half a drachm of the latter, repeated at intervals of from four to six hours. If the patient be unable to swallow, the chloral may be given in an enema. The remarkable influence of bromide of potassium in controlling the eclampsia of infants would seem to be an indication for its use in puerperal cases. Fordyce Barker is opposed to the use of chloral, which he thinks excites instead of lessening reflex irritability.¹ Another form of narcotic, not entirely free from theoretical objections, but strongly recommended by those who have used it, is the subcutaneous injection of morphia, which has the advantage of being applicable when the patient is quite unable to swallow. This may be given in doses of one-third of a grain, repeated in a few hours, so as to keep the patient well under its influence. It is to be remembered that the object is to control muscular action, so as to prevent, as much as possible, the violent convulsive paroxysm, and, therefore, it is necessary

¹ *The Puerperal Diseases*, p. 120.

that the narcosis, however produced, should be continuous. It is rational, therefore, to combine the intermittent action of chloroform with the more continuous action of other remedies, so that the former should supplement the latter when insufficient.

Other remedies, supposed to act in the way of antidotes to uræmic poisoning, have been advised, such as acetic or benzoic acid, but they are far too uncertain to have any reliance placed on them, and they distract attention from more useful measures.

Other remedies.

Certain precautions are necessary during the fits to prevent the patient injuring herself, especially to obviate the laceration of the tongue; the latter can be best done by placing something between the teeth as the paroxysm comes on, such as the handle of a teaspoon enveloped in several folds of flannel.

Precautions during the paroxysm.

The obstetric management of eclampsia will naturally give rise to much anxiety, and on this point there has been considerable difference of opinion. On the one hand, we have practitioners who advise the immediate emptying of the uterus, even when labour has ~~not~~ commenced; on the other, those who would leave the labour entirely alone. Thus Gooch said, 'attend to the convulsions, and leave the labour to take care of itself;' and Schröder says, 'especially no kind of obstetric manipulation is required for the safety of the mother,' admitting, however, that it is sometimes advisable to hasten the labour to ensure the safety of the child.

Obstetric management.

In cases in which the convulsions come on during labour, the pains are often strong and regular, the labour progresses satisfactorily, and no interference is needful. In others we cannot but feel that the emptying of the uterus would be decidedly beneficial. We have to reflect, however, that any active interference with the uterus might, of itself, prove very irritating, and excite fresh attacks. The influence of uterine irritation is apparent by the frequency with which the paroxysms recur with the pains. If, therefore, the os be undilated, and labour have not begun, no active means to induce it should be adopted, although the membranes may be ruptured with advantage, since that procedure tends to no irritation. Forceful dilatation of the os, and especially turning, are strongly contra-indicated.

The rule laid down by Tyler Smith seems that which is most advisable to follow—that we should adopt the course which seems least likely to prove a source of irritation to the mother. Thus if the fits seem evidently induced and kept up by the pressure of the foetus, and the head be within reach, the forceps or even craniotomy may be resorted to. But if, on the other hand, there be reason to think that the operation necessary to complete delivery is likely *per se* to prove a greater source of irritation than leaving the case to nature, then we should certainly not interfere.

CHAPTER IV.

PUERPERAL INSANITY.

UNDER the head of '*Puerperal Mania*' writers on obstetrics have indiscriminately classed all cases of mental disease connected with pregnancy and parturition. The result has been unfortunate, for the distinction between the various types of mental disorder has, in consequence, been very generally lost sight of. But little study of the subject suffices to show that the term *Puerperal Mania* is wrong in more ways than one, for we find that a large number of cases are not cases of 'mania' at all, but of melancholia; while a considerable number are not, strictly speaking, 'puerperal,' as they either come on during pregnancy, or long after the immediate risks of the puerperal period are over, being in the latter case associated with anæmia produced by over-lactation. For the sake of brevity, the generic term of '*Puerperal Insanity*' may be employed to cover all cases of mental disorder connected with gestation, while they may be further conveniently sub-divided into three classes, each of which has its special characteristics, viz.:—

Classification.

Puerperal insanity may be divided into three classes of cases.

I. *The Insanity of Pregnancy.*

II. *Puerperal Insanity*, properly so called, that is insanity coming on within a limited period after delivery.

III. *The Insanity of Lactation.*

This division is a strictly natural one, and includes all the cases likely to come under observation. The relative proportion these classes bear to each other can only be determined by accurate statistical observations on a large scale, the materials for which we do not possess. The returns from large asylums are obviously open to objection, for only the worst and most confirmed cases find their way into these institutions, while by far the greater proportion, both before and after labour, are treated in their own homes.

Taking such returns as only approximative, we find from

Dr. Batty Tuke¹ that in the Edinburgh Asylum out of 105¹³⁵ cases of puerperal insanity, 28 occurred before delivery, 13 during the puerperal period, and 54 during lactation. The relative proportion of each per hundred are as follows:—

Proportion
of these
forms of
insanity.

Insanity of Pregnancy, 18·06 per cent.

Puerperal Insanity, 47·09 „

Insanity of Lactation, 34· 8 „

Marcé² collects together several series of cases from various authorities, amounting to 310 in all, and the results are not very different from those of the Edinburgh Asylum, except in the relatively smaller number of cases occurring before delivery. The percentage calculated from his figures are:

Insanity of Pregnancy, 8·06 per cent.

Puerperal Insanity, 58·06 „

Insanity of Lactation, 30·30 „

As each of these classes differ in various important respects from the others, it will be better to consider each separately.

Insanity of
pregnancy.

The Insanity of Pregnancy is, without doubt, the least common of the three forms. The intense mental depression which in many women accompanies pregnancy, and causes the patient to take a desponding view of her condition, and to look forward to the result of her labour with the most gloomy apprehension, seems to be often only a lesser degree of the actual mental derangement which is occasionally met with. The relation between the two states is further borne out by the fact that a large majority of cases of insanity during pregnancy are well marked types of melancholia; out of 28 cases, reported by Tuke, 15 were examples of pure melancholia, 5 of dementia with melancholia. In many of these the attack could be traced as developing itself out of the ordinary hypochondriasis of pregnancy. In others the symptoms came on at a later period of pregnancy, the earlier months of which had not been marked by any unusual lowness of spirits. The age of the patient seems to have some influence, the proportion of cases between 30 and 40 years of age being much larger than in younger women. A larger proportion of cases occur in *primiparæ* than in *multi-paræ*, a fact that, no doubt, depends on the greater dread and apprehension experienced by women who are pregnant for

Predis-
posing
causes.

¹ *Edin. Med. Journ.* vol. x.

² *Traité de la Folie des Femmes enceintes.*

the first time, especially if not very young. Hereditary disposition plays an important part, as in all forms of puerperal insanity. It is not always easy to ascertain the fact of an hereditary taint, since it is often studiously concealed by the friends. Tuke, however, found distinct evidence of it in no less than 12 out of 28 cases. Fürstner¹ believes that other neuroses have an important influence in the causation of the disease. Out of 32 cases he found direct hereditary taint in 9, but in 11 more there was a family history of epilepsy, drunkenness, or hysteria.

The period of pregnancy, at which mental derangement most commonly shows itself, varies. Most generally, perhaps, it is at the end of the third, or the beginning of the fourth month. It may, however, begin with conception, and even return at every impregnation. Montgomery relates an instance in which it recurred in three successive pregnancies. Marcé distinguishes between true insanity coming on during pregnancy, and aggravated hypochondriasis, by the fact that the latter usually lessens after the third month, while the former most commonly only begins after that date. It is unquestionable that in many cases no such distinction can be made, and that the two are often very intimately associated.

Period of pregnancy at which it occurs.

The form of insanity does not differ from ordinary melancholia. The suicidal tendency is generally very strongly developed. Should the mental disorder continue after delivery, the patient may very probably experience a strong impulse to kill her child. Moral perversions have been not uncommonly observed. Tuke especially mentions a tendency to dipsomania in the early months, even in women who have not shown any disposition to excess at other times. He suggests that this may be an exaggeration of the depraved appetite, or morbid craving, so commonly observed in pregnant women, just as melancholia may be a further development of lowness of spirits. Laycock mentions a disposition to 'kleptomania' as very characteristic of the disease. Cooper² relates a curious case where this occurred in a pregnant lady of rank, and the influence of pregnancy, in developing an irresistible tendency, was pleaded in a criminal trial in which one of her petty thefts had involved her.

Form of insanity.

¹ *Archiv für Psychiatric*, Band v. Heft 2.

² *Cooper's Forensic Medicine*, vol. iv.

Prognosis.

The prognosis may be said to be, on the whole, favourable. Out of Dr. Tuke's 28 cases, 19 recovered within six months. There is little hope of a cure until after the termination of the pregnancy, as out of 19 cases recorded by Marcé only in 2 did the insanity disappear before delivery.

Transient mania during delivery.

There is a peculiar form of mental derangement sometimes observed during labour, which is by some talked of as a temporary insanity. It may, perhaps, be more accurately described as a kind of acute delirium, produced, in the latter stage of labour, by the intensity of the suffering caused by the pains. According to Montgomery, it is most apt to occur as the head is passing through the cervix, or, at a later period, during the expulsion of the child. It may consist of merely a loss of control over the mind, during which the patient, unless carefully watched, might, in her agony, seriously injure herself or her child. Sometimes it produces actual hallucination, as in the case described by Tarnier, in which the patient fancied she saw a spectre standing at the foot of her bed, which she made violent efforts to drive away. This kind of mania, if it may be so called, is merely transitory in its character, and disappears as soon as the labour is over. From a medico-legal point of view it may be of importance, as it has been held by some that in certain cases of infanticide the mother has destroyed the child when in this state of transient frenzy, and when she was irresponsible for her acts. In the treatment of this variety of delirium we must, of course, depend on lessening the intensity of the suffering, and it is in such cases that chloroform will find one of its most valuable applications.

Puerperal insanity (proper).

True puerperal insanity has always attracted much attention from obstetricians, often to the exclusion of other forms of mental disturbance connected with the puerperal state. We may define it to be, that form of insanity which comes on within a limited period after delivery, and which is probably intimately connected with that process. Out of 73 examples of the disease tabulated by Dr. Tuke only 2 came on later than a month after delivery, and in these there were other causes present, which might possibly remove them from this class.

Form of insanity.

Although a large number of these cases assume the character of acute mania, that is by no means the only kind

of insanity which is observed, a not inconsiderable number being well-marked examples of melancholia. The distinction between them was long ago pointed out by Gooch, whose admirable monograph on the disease contains one of the most graphic and accurate accounts of puerperal insanity that has yet been written.

There are also some peculiarities as to the period at which these varieties of insanity show themselves, which, taken in connection with certain facts in their etiology, may eventually justify us in drawing a stronger line of demarcation between them than has been usual. It appears that cases of acute mania are apt to come on at a period much nearer delivery than melancholia. Thus Tuke found that all the cases of mania came on within 16 days after delivery, and that all the cases of melancholia developed themselves after that period. We shall presently see that one of the most recent theories as to the causation of the disease attributes it to some morbid condition of the blood. Should farther investigation confirm this supposition, inasmuch as septic conditions of the blood are most likely to occur a short time after labour, it would not be an improbable hypothesis, that cases of acute mania, occurring within a short time after labour, may depend on such septic causes, while melancholia is more likely to arise from general conditions favouring the development of mental disease. This must, however, be regarded as a mere speculation requiring further investigation.

Acute mania generally occurs shortly after delivery; melancholia at a later period.

Hereditary predisposition is very frequently met with, and a careful enquiry into the patient's history will generally show that other members of the family have suffered from mental derangement. Reid found that out of 111 cases in Bethlehem Hospital there was clear evidence of hereditary taint in 45. Tuke made the same observation in 22 out of his 73 cases; and, indeed, it is pretty generally admitted by all alienist physicians that hereditary tendencies form one of the strongest predisposing causes to mental disturbance in the puerperal state. In a large proportion of cases circumstances producing debility and exhaustion, or mental depression, have preceded the attack. Thus it is often found that patients attacked with it have had post-partum hæmorrhage, or have suffered from some other conditions producing exhaustion, such as severe and complicated labour; or they

Causes.

may have been weakened by over-frequent pregnancies, or by lactation during the early months of pregnancy. Indeed anæmia is always well marked in this disease. Mental conditions also are frequently traceable in connection with its production. Morbid dread during pregnancy, insufficient to produce insanity before delivery, may develop into mental derangement after it. Shame and fear of exposure in unmarried women not unfrequently lead to it, as is evidenced by the fact that out of 2,281 cases, gathered from the reports of various asylums, above 64 per cent. were unmarried.¹ Sudden moral shocks or vivid mental impressions may be the determining cause in predisposed persons. Gooch narrates an example of this in a lady who was attacked immediately after a fright produced by a fire close to her house, the hallucinations in this case being all connected with light; and Tyler Smith that of another whose illness dated from the sudden death of a relative. The age of the patient has some influence, and there seems to be a decidedly greater liability at advanced ages, especially when such women are pregnant for the first time.

Theory of its dependence on morbid state of blood.

The possibility of the acute form of puerperal insanity, coming on shortly after delivery, being dependent on some form of septicæmia is one which deserves careful consideration. The idea originated with Sir James Simpson, who found albumen in the urine of 4 patients. He suggested that this might probably indicate the presence in the blood of certain urinary constituents, which might have determined the attack, much in the same way as in eclampsia. Dr. Donkin subsequently wrote an important paper,² in which he warmly supported this theory, and arrived at the conclusion, 'that the acute dangerous class of cases are examples of uræmic blood-poisoning, of which the mania, rapid pulse, and other constitutional symptoms are merely the phenomena; and that the affection, therefore, ought to be termed uræmic or renal puerperal mania, in contradistinction to the other form of the disease.' He also suggests that the immediate poison may be carbonate of ammonia, resulting from the decomposition of urea retained in the blood. It will be observed, therefore, that the pathological condition producing

¹ *Journ. of Mental Science*, 1870-1, p. 159.

² *Edin. Med. Journ.* vol. viii.

puerperal mania would, supposing this theory to be correct, be precisely the same as that which, at other times, gives rise to puerperal eclampsia. There can be no doubt that the patient, immediately after delivery, is in a condition rendering her peculiarly liable to various forms of septic disease; and it must be admitted that there is no inherent improbability in the supposition that some morbid material circulating in the blood may be the effective cause of the attack, in a person otherwise predisposed to it. It is also certain, as I have already pointed out, that there are two distinct classes of cases, differing according to the period after delivery at which the attack comes on. Whether this difference depends on the presence in the blood of some septic matter—especially retained urinary excreta—is a question which our knowledge by no means justifies us in answering. Unquestionably it is one which well merits further careful study.

It is only fair to point to some difficulties which appear to militate against the view which Dr. Donkin maintains. In the first place, the albuminuria is merely transient, while its supposed effects last for weeks or months. Sir James Simpson says, with regard to his cases: 'I have seen all traces of albuminuria in puerperal insanity disappear from the urine within fifty hours of the access of the malady. The general rapidity of its disappearance is, perhaps, the principal, or, indeed, the only reason why this complication has escaped the notice of those physicians among us who devote themselves with such ardour and zeal to the treatment of insanity in our public asylums.' This apparent anomaly Simpson attempts to explain by the hypothesis that, when once the uræmic poisoning has done its work, and set the disease in progress, the mania progresses of itself. This, however, is pure speculation; and, in the supposed analogous case of eclampsia, the albuminuria certainly lasts as long as its effects. It is not easy to understand, also, why uræmic poisoning should in one case give rise to insanity, and in another to convulsions. For all we know to the contrary, transient albuminuria may be much more common after delivery than has been generally supposed, and further investigation on this point is required. It has, of late years, been shown that albumen is by no means unfrequent, for a short time, in various conditions of the body, without any serious

Objections
to this
theory.

consequences, as, for example, after bathing; and we might too readily draw an unjustifiable conclusion from its detection in a few cases of mania. There are, however, many other kinds of blood-poisoning, besides uræmia, which may have an influence in the production of the disease, and it is to be hoped that future observations may enable us to speak with more certainty on this point.

Prognosis.

The prognosis of puerperal insanity is a point which will always deeply interest those who have to deal with so distressing a malady. It may resolve itself into a consideration of the immediate risk to life, and of the chances of ultimate restoration of the mental faculties. It is an old aphorism of Gooch's, and one the correctness of which is justified by modern experience, that 'mania is more dangerous to life, melancholia to reason.' It has very generally been supposed that the immediate risk to life in puerperal mania is not great, and, on the whole, this may be taken as correct. Tuke found that death took place from all causes, in 10·9 of the cases under observation; these, however, were all women who had been admitted into asylums, and in whom the attack may be assumed to have been exceptionally severe. Great stress was laid by Hunter and Gooch on extreme rapidity of the pulse, as indicating a tendency to death. There can be no doubt that it is a symptom of great gravity, but by no means one which need lead us to despair of our patient's recovery. The most dangerous class of cases are those attended with some inflammatory complication; and if there be marked elevation of temperature, indicating the presence of some such concomitant state, our prognosis must be more grave than when there is mere excitement of the circulation.

Post-mortem signs.

There are no marked post-mortem signs found in fatal cases to guide us in forming an opinion as to the nature of the disease. 'No constant morbid changes,' says Tyler Smith, 'are found within the head, and most frequently the only condition found in the brain is that of unusual paleness and exsanguinity. Many pathologists have also remarked upon the extremely empty condition of the blood vessels, particularly the veins.'

Duration of the disease.

The duration of the disease varies considerably. Generally speaking, cases of mania do not last so long as melan-

cholia, and recovery takes place within a period of three months, often earlier. Very few of the cases admitted into the Edinburgh asylum remained there more than six months, and after that time the chances of ultimate recovery greatly lessened. When the patient gets well, it often happens that her recollection of the events occurring during her illness is lost; at other times, the delusions from which she suffered remain; as, for example, in a case which was under my care, in which the personal antipathies which the patient formed when insane became permanently established.

54 out of the 155 cases collected by Dr. Tuke were examples of the insanity of lactation, which would appear, therefore, to be nearly twice as common as that of pregnancy, but considerably less so than the true puerperal form. Its dependence on causes producing anæmia and exhaustion is obvious and well marked. In the large majority of cases it occurs in multiparæ who have been debilitated by frequent pregnancies, and by length of nursing. When occurring in primiparæ, it is generally in women who have suffered from postpartum hæmorrhage, or other causes of exhaustion, or whose constitution was such as should have contra-indicated any attempt at lactation. The *bruit-de-diable* is almost invariably present in the veins of the neck, indicating the impoverished condition of the blood.

Insanity of lactation.

Generally occurs in women with debilitated constitutions.

The type is far more frequently melancholic than maniacal, and when the latter form occurs, the attack is much more transient than in true puerperal insanity. The danger to life is not great, especially if the cause producing debility be recognised and at once removed. There seems, however, to be more risk of the insanity becoming permanent than in the other forms. In 12 out of Dr. Tuke's cases the melancholia degenerated into dementia, and the patient became hopelessly insane.

It is generally melancholic in type.

The symptoms of these various forms of insanity are practically the same as in the non-pregnant state.

Symptoms.

Generally in cases of mania there is more or less premonitory indication of mental disturbance, which may pass unperceived. The attack is often preceded by restlessness and loss of sleep, the latter being a very common and well-marked symptom; or, if the patient do sleep, her rest is broken and disturbed by dreams. Causeless dislikes to those around her

In cases of mania.

are often observed; the nurse, the husband, the doctor, or the child, become the objects of suspicion, and, unless proper care be taken, the child may be seriously injured. As the disease advances, the patient becomes incoherent and rambling in her talk, and, in a fully-developed case, she is incessantly pouring forth an unconnected jumble of sentences, out of which no meaning can be made. Often some prevalent idea which is dwelling in the patient's mind can be traced running through her ravings, and it has been noticed that this is frequently of a sexual character, causing women of unblemished reputation to use obscene and disgusting language, which it is difficult to understand their even having heard. The tendency of such patients to make accusations impugning their own chastity was specially insisted on by many eminent authorities in a recent celebrated trial, when Sir James Simpson stated that in his experience 'the organ diseased gave a type to the insanity, so that with women suffering from affections of the genital organs the delusions would be more likely to be connected with sexual matters.' Religious delusions, as a fear of eternal damnation, or of having committed some unpardonable sin, are of frequent occurrence, but perhaps more often in cases which are tending to the melancholic type. Associated with this marked mental disturbance, there is generally intolerable restlessness, and the patient's whole manner and appearance are those of excessive excitement. She may refuse to remain in bed, may tear off her clothes, or attempt to injure herself. The suicidal tendency is often very marked. In one case under my care, the patient made incessant efforts to destroy herself, which were only frustrated by the most careful watching; she endeavoured to strangle herself with the bed-clothes, to swallow any article she could lay hold of, and even to gouge out her own eyes. Food is generally persistently refused, and the utmost coaxing may fail in inducing the patient to take nourishment. The pulse is rapid and small, and the more violent the excitement and furious the delirium, the more excited is the circulation. The tongue is coated and furred, the bowels constipated and disordered, and the fæces, as well as the urine, are frequently passed involuntarily. The urine is scanty and high-coloured, and, after the disease has lasted for some time, it becomes loaded with phosphates. The

lochia, and the secretion of milk, generally become arrested at the commencement of the disease. The waste of tissue, from the incessant restlessness and movement of the patient, is very great; and, if the disease continue for some time, she falls into a condition of marasmus, which may be excessive, so that she becomes wasted to a shadow of her former size.

When the insanity assumes the form of melancholia, its advent is more gradual. It may commence with depression of spirits, without any adequate cause, associated with insomnia, disturbed digestion, headache, and other indications of bodily derangement. Such symptoms, showing themselves in women who have been nursing for a length of time, or in whom any other evident cause of exhaustion exists, should never pass unnoticed. Soon the signs of mental depression increase, and positive delusions show themselves. These may vary much in their amount, but they are all more or less of the same type, and very often of a religious character. The amount of constitutional disturbance varies much. In some cases which approach in character those of mania, there is considerable excitement, rapid pulse, furred tongue, and restlessness. Probably cases of acute melancholia, coming on during the puerperal state, most often assume this form. In others again there is less of these general symptoms, the patients are profoundly dejected, sit for hours without speaking or moving; but there is not much excitement, and this is the form most generally characterising the insanity of lactation. In all cases there is a marked disinclination to food. There is also, almost invariably, a disposition to suicide; and it should never be forgotten in melancholic cases that this may develop itself in an instant, and that a moment's carelessness on the part of the attendants may lead to disastrous results.

Symptoms
in melan-
cholia.

Bearing in mind what has been said of the essential character of puerperal insanity, it is obvious that the course of treatment must be mainly directed to maintain the strength of the patient, so as to enable her to pass through the disease without fatal exhaustion of the vital powers, while we endeavour, at the same time, to calm the excitement, and give rest to the disturbed brain. Any over-active measures—for example, bleeding, blistering the shaven scalp, and the like—are distinctly contra-indicated.

Treatment.

There is a general agreement on the part of alienist physicians that in cases of acute mania the two things most needful are a sufficient quantity of suitable food, and sleep.

Importance of administering nourishment.

With regard to the former, every endeavour should be made to induce the patient to take abundance of nourishment, to remedy the effects of the excessive waste of tissue, and support her strength until the disease abates. Dr. Blandford, who has especially insisted on the importance of this indication, says,¹ 'Now, with regard to the food, skilful attendants will coax a patient into taking a large quantity, and we can hardly give too much. Messes of minced meat with potato and greens, diluted with beef-tea, bread and milk, rum and milk, arrowroot, and so on, may be got down. Never give mere liquids so long as you can get down solids. As the malady progresses, the tongue and mouth may become so dry and foul that nothing but liquids can be swallowed; but, reserving our beef-tea and brandy, let us give plenty of solid food while we can.'

Forceible administration of food.

The patient may in mania, as well as in melancholia, perhaps even more in the latter, obstinately refuse to take nourishment at all, and we may be compelled to use force. Various contrivances have been employed for this purpose. One of the simplest is introducing a dessert-spoon forcibly between the teeth, the patient being controlled by an adequate number of attendants, and slowly injecting into the mouth suitable nourishment, by an india-rubber bottle with an ivory nozzle, such as is sold by all chemists. Care must be taken not to inject more than an ounce at a time, and to allow the patient to breathe between each deglutition. So extreme a measure will seldom be required, if the patient have experienced attendants, who can overcome her resistance to food by gentler means; but it may be essential, and it is far better to employ it than to allow the patient to become exhausted from want of nourishment. In one case I had to feed a patient in this way three times a day for several weeks, and used for the purpose a contrivance known in asylums as Paley's feeding-bottle, which reduced the difficulty of the process to a minimum. Beef-tea, or strong soup, mixed with some farinaceous material, such as Ravelenta Arabica, or wheaten flour, or milk, form the best mess for this purpose.

¹ Blandford, *Insanity and its Treatment*.

In the early stages the patient is probably better without stimulants, which seem only to increase the excitement. As the disease progresses, and exhaustion becomes marked, it may be necessary to have recourse to them. In melancholia they seem to be more useful, and may be administered with greater freedom. Stimulants.

The state of the bowels requires especial attention. They are almost always disordered, the evacuations being dark, and offensive in odour. In the early stages of the disease, the prompt clearing of the bowels, by a suitable purgative, sometimes has the effect of cutting short an impending attack. A curious example of this is recorded by Gooch, in which the patient's recovery seemed to date from the free evacuation of the bowels. A few grains of calomel, or a dose of compound jalap powder, or of castor-oil, may generally be readily given. During the continuance of the illness the state of the primæ viæ should be attended to, and occasional aperients will be useful, but strong and repeated purgation is hurtful from the debility it produces. State of the bowels

The procuring of sleep will necessarily form one of the most important points of treatment. For this purpose there is no drug so valuable as the hydrate of chloral, either alone, or in combination with bromide of potassium, which has a distinct effect in increasing its hypnotic action. Given in a full dose at bed-time, say 15 grs. to 3ss. it rarely fails in procuring at least some sleep, and, in an early stage of acute mania, this may be followed by the best effects. It may be necessary to repeat this medication night after night, during the acute stage of the malady. If we cannot induce the patient to swallow the medicine, it may be given in the form of enema. The procuring of sleep.

It is generally admitted that in mania preparations of opium, formerly much relied on in the treatment of the disease, are apt to do more harm than good. Dr. Blandford gives a strong opinion on this point. He says: 'In prolonged delirious mania I believe opium never does good, and may do great harm. We shall see the effects of narcotic poisoning if it be pushed, but none that are beneficial. This applies equally to opium given by the mouth and by subcutaneous injection. The latter, as it is more certain and effectual in producing good results, is also more deadly when it acts as a Question of administering opiates.

narcotic poison. After the administration of a dose of morphia by the sub-cutaneous method, the patient will probably at once fall asleep, and we congratulate ourselves that our long wished-for object is attained. But after half an hour or so the sleep suddenly terminates, and the mania and excitement are worse than before. Here you may possibly think that had the dose been larger, instead of half an hour's sleep you would have obtained one of longer duration, and you may administer more, but with a like result. Large doses of morphia not merely fail to produce refreshing sleep; they poison the patient, and produce, if not the symptoms of actual narcotic poisoning, at any rate that typhoid condition which indicates prostration and approaching collapse. I believe there is no drug, the use of which more often becomes abused than that of opium.' It is otherwise in cases of melancholia, especially in the more chronic forms. In these opiates, in moderate doses, not pushed to excess, may be given with great advantage. The sub-cutaneous injection of morphia is by far the best means of exhibiting the drug, from its rapidity of action, and facility of administration.

Other
calmatives.

There are other methods of calming the excitement of the patient besides the use of medicines. The prolonged use of the warm bath, the patient being immersed in water at a temperature of 90° or 92° for at least half an hour, is highly recommended by some as a sedative. The wet pack serves the same purpose, and is more readily applied in refractory subjects.

Import-
ance of
judicious
nursing.

The judicious nursing of the patient is a point of primary importance. She should be kept in a cool, well ventilated, and somewhat darkened room. If possible she should remain in bed, or, at least, endeavours should be made to restrain the excessive restless motion, which has so much effect in promoting exhaustion. The presence of relatives and friends, especially the husband, has generally a prejudicial and exciting effect; and it is advisable to place the patient under the care of nurses experienced in the management of the insane, and who, as strangers, are likely to have more control over her. It is not too much to say that much of the success in ~~treatment~~ must depend on the manner in which this indication is met. Rough, unskilled nurses, who do not know how

to use gentleness combined with firmness, will certainly aggravate and prolong the disorder. Inasmuch as no patient should be left unwatched by day or night, more than one nurse is essential.

The question of the removal of the patient to an asylum is one which will give rise to anxious consideration. As the fact of having been under such restraint of necessity fixes a certain lasting stigma upon a patient, this is a step which everyone would wish to avoid if possible. In cases of acute mania, which will probably last a comparatively short time, home treatment can generally be efficiently carried out. Much must depend on the circumstances of the patient. If these be of a nature which preclude the possibility of her obtaining thoroughly efficient nursing and treatment in her own home, it is advisable to remove her to a place where these essentials can be obtained, even at the cost of some subsequent annoyance. In cases of chronic melancholia, the management of which is on the whole more difficult, the necessity for such a measure is more likely to arise, and should not be postponed too late. Many examples of incurable dementia, arising out of puerperal melancholia, can be traced to unnecessary delay in placing the patients under the most favourable conditions for recovery.

Question of removal to an asylum.

When convalescence is commencing, change of air and scene will often be found of great value. Removal to some quiet country place, where the patient can enjoy abundance of air and exercise, in the company of her nurses, without the excitement of seeing many people, is especially to be recommended. Great caution must be used in admitting the visits of relatives and friends. In two cases under my own care the patients relapsed, when apparently progressing favourably, because the husbands insisted, contrary to advice, in seeing their wives. On the other hand, Gooch has pointed out that, when the patient is not recovering, when month after month has been passed in seclusion without any improvement, the visit of a friend or relative may produce a favourable moral impression, and inaugurate a change for the better. It is probably in cases of melancholia, rather than in mania, that this is likely to happen. The experiment may, under such circumstances, be worth trying; but it is one the result of which we must contemplate with some anxiety.

Treatment during convalescence.

CHAPTER V.

PUERPERAL SEPTICÆMIA.

Difference
of opinion
as to puer-
peral
fever.

THERE is no subject in the whole range of obstetrics which has caused so much discussion and difference of opinion as that to which this chapter is devoted. Under the name of '*Puerperal Fever*' the disease we have to consider has given rise to endless controversy. One writer after another has stated his view of the nature of the affection with dogmatic precision, often on no other grounds than his own preconceived notions, and an erroneous interpretation of some of the post-mortem appearances. Thus, one states that puerperal fever is only a local inflammation, such as peritonitis; others declare it to be phlebitis, metritis, metro-peritonitis, or an essential zymotic disease *sui generis*, which affects lying-in women only. The result has been a hopeless confusion; and the student rises from the study of the subject with little more useful knowledge than when he began. Fortunately, modern research is beginning to throw a little light upon the chaos.

Confusion
resulting
from this
cause.

Modern
view of
the
disease.

The whole tendency of recent investigation is daily rendering it more and more certain that obstetricians have been led into error by the special virulence and intensity of the disease, and that they have erroneously considered it to be something special to the puerperal state, instead of recognising in it a form of septic disease practically identical with that which is familiar to surgeons under the name of pyæmia or septicæmia.

Objection
to the
name
'puerperal
fever.'

If this view be correct, the term '*puerperal fever*,' conveying the idea of a fever such as typhus or typhoid, must be acknowledged to be in itself misleading, and one that should be discarded, as only tending to confusion. Before discussing at length the reasons which render it probable that this form of disease is in no way specific, or peculiar to the puerperal state, it will be well to relate briefly some of the leading facts connected with it.

More or less distinct references to the existence of the so-called puerperal fever are met with in the classical authors, proving, beyond doubt, that the disease was well-known to them; and Hippocrates, besides relating several cases the nature of which is unquestionable, clearly recognises the possibility of its originating in the retention and decomposition of portions of the placenta. Although Harvey and other writers showed that they were more or less familiar with it, and even made most creditable observations on its etiology, it was not until the latter half of the last century that it came prominently into notice. At that time the frightful mortality occurring in some of the principal lying-in hospitals, especially in the Hôtel Dieu at Paris, attracted attention; and ever since the disease has been familiar to obstetricians.

History of the disease.

Its prevalence in hospitals in which lying-in women are congregated has been constantly observed both in this country and abroad, occasionally producing an appalling death-rate; the disease, when once it has appeared, frequently spreading from one patient to another, in spite of all that could be done to arrest it. It would be easy to give many startling instances of this. Thus it prevailed in London in the years 1760, 1768, and 1770, to such an extent, that in some lying-in institutions nearly all the patients died. Of the Edinburgh Infirmary in 1773, it is stated that 'almost every woman, as soon as she was delivered, or perhaps about twenty-four hours after, was seized with it, *and all of them died*, though every method was used to cure the disorder.' On the continent, where the lying-in institutions are on a much larger scale, the mortality was equally great. Thus in the Maison d'Accouchements of Paris, in a number of different years, sometimes as many as 1 in 3 of the women delivered died; on one occasion 10 women dying out of 15 delivered. Similar results were observed in other great Continental hospitals, as in Vienna, where, in 1823, 19 per cent. of the cases died, and, in 1842, 16 per cent.; and in Berlin, in 1862, hardly a single patient escaped, the hospital being eventually closed.

Mortality resulting from it in lying-in hospitals.

Such facts, the correctness of which is beyond any question, prove to demonstration the great risk which may accompany the aggregation of lying-in women. Whether they

Do these facts justify the inference that lying-in hospitals should be abolished?

justify the conclusion that all lying-in hospitals should be abolished, is another and a very wide question, which can scarcely be satisfactorily discussed in a practical work. It is to be observed, however, that most of the cases in which the disease produced such disastrous results, occurred before our more recent knowledge of its mode of propagation was acquired, when no sufficient hygienic precautions were adopted, when ventilation was little thought of, and when, in a word, every condition prevailed that would tend to favour the spread of a contagious disease from one patient to another. More recent experience proves that when the contrary is the case (as for example in such an institution as the Rotunda Hospital in Dublin), the occurrence of epidemics of this kind may be entirely prevented, and the mortality approximated to that of home practice.

The assumption of a puerperal miasm is unnecessary.

The more closely the history of these outbreaks in hospitals is studied, the more apparent does it become that they are not dependent on any miasm necessarily produced by the aggregation of puerperal patients, but on the direct conveyance of septic matter from one patient to another.

There is no sufficient ground for believing in general epidemics of the disease.

In numerous instances the disease has been said to be generally epidemic in domiciliary practice, much in the same way as scarlet fever, or any other zymotic complaint, might be. Such epidemics are described as having occurred in London in 1827-28, in Leeds in 1809-12, in Edinburgh in 1825, and many others might be cited. There is, however, no sufficient ground for believing that the disease has ever been epidemic in the strict sense of the word. That numerous cases have often occurred in the same place, and at the same time, is beyond question; but this can easily be explained without admitting an epidemic influence, knowing, as we do, how readily the septic matter may be conveyed from one patient to another. In many of the so-called epidemics the disease has been limited to the patients of certain midwives or practitioners, while those of others have entirely escaped; a fact easily understood on the assumption of the disease being produced by septic matter conveyed to the patient, but irreconcilable with the view of general epidemic influence.

It would be a useless task to detail at length the theories

that have been advanced to explain the disease. Indeed it may safely be held that the supposed necessity of providing a theory which would explain all the facts of the disease has done more to surround it with obscurity than even the difficulties of the subject itself. If any real advance is to be made, it can only be by adopting an humble attitude, by admitting that we are only on the threshold of the enquiry, and by a careful observation of clinical facts, without drawing from them too positive deductions.

Numerous theories advanced regarding its nature.

Many have taught that the disease is essentially a local inflammation, producing secondary constitutional effects. This view doubtless originated from too exclusive attention to the morbid changes found on post-mortem examination. Extensive peritonitis, phlebitis, inflammation of the lymphatics, or of the tissues of the uterus itself, are very commonly found after death; and each of these has, in its turn, been believed to be the real source of the disease. This view finds but little favour with modern pathologists, and is in so many ways inconsistent with clinical facts, that it may be considered to be obsolete. No one of the conditions above mentioned is universally found, and, in the worst cases, definite signs of local inflammation may be entirely absent. Nor will this theory explain the conveyance of the disease from one patient to another, or the peculiar severity of the constitutional symptoms.

Theory of its local origin.

Objections to this theory.

A more admissible theory, and one which has been extensively entertained, is, that there is an essential zymotic fever peculiar to, and only attacking, puerperal women, which is as specific in its nature as typhus or typhoid, and to which the local phenomena observed after death bear the same relation that the pustules on the skin do to small-pox, or the ulcers in the intestinal glands to typhoid. This fever is supposed to spread by contagion and infection, and to prevail epidemically, both in private and in hospital practice. The most recent exponent of this view is Fordyce Barker, who, in his excellent work on the 'Puerperal Diseases,' has entered at length into all the theories of the disease. He, like others who hold his opinions, has, I cannot but think, entirely failed to bring forward any conclusive evidence of the existence of such a specific fever. It is no doubt true that in typhus and typhoid, and other undoubted examples of this class of disease, there are

Theory of an essential zymotic fever.

Arguments against it.

well-marked local secondary phenomena; but then they are distinct and constant. He makes no attempt to prove that anything of the kind occurs in puerperal fever. On the contrary, probably there are no two cases in which similar local phenomena occur; nor is there any case in which the most practised obstetrician could foretell, either the course and duration of the illness, or the local phenomena. Again, this theory altogether fails to explain the very important class of cases which can be distinctly traced to sources originating in the patient herself, viz. the absorption of septic matter from decomposing coagula, and the like. Barker meets this difficulty by placing such cases of auto-infection under a separate category, admitting that they are examples of septicæmia. But he fails to show that there is any difference in symptomatology or post-mortem signs between them and the cases he believes to depend on an essential fever; nor would it be possible to distinguish the one from the other by either their clinical or pathological history.

Theory of
identity
with
surgical
septicæ-
mia.

The modern view, which holds that the disease is, in fact, identical with the condition known as pyæmia or septicæmia, is by no means free from objections, and much patient clinical investigation is required to give a satisfactory explanation of certain peculiarities which the disease presents; but, in spite of these difficulties, which time may serve to remove, it offers a far better explanation of the phenomena observed than any other that has yet been advanced.

Nature of
this view.

According to this theory the so called puerperal fever is produced by the absorption of septic matter into the system, through solutions of continuity in the generative tract, such as always exist after labour. It is not essential that the poison should be peculiar or specific; for, just as in surgical pyæmia, any decomposing organic matter, either originating within the generative organs of the patient herself, or coming from without, may set up the morbid action.

In describing the disease under discussion, I shall assume that, so far as our present knowledge goes, this view is the one most consonant with facts; but, bearing in mind that very little is yet known of surgical septicæmia, it must not be expected that obstetricians can satisfactorily explain all the phenomena they observe.

The best basis of description I know of, is that given by Burdon Sanderson, when he says, 'in every pyæmic process you may trace a focus, a centre of origin, lines of diffusion or distribution, and secondary results from the distribution. In every case an initial process from which infection commences, from which the infection spreads, and secondary processes which come out of this primary one.'¹ Adopting this division, I shall first treat of the mode in which the infection may commence in obstetric cases, and point out the special difficulties which this part of the subject presents.

Basis of description.

The fact that all recently delivered women present lesions of continuity in the generative tract, through which septic matter, brought into contact with them, may be readily absorbed, has long been recognised by obstetricians. The analogy between the interior of the uterus and the surface of a stump after operation, was particularly insisted on by Cruvelhier, Simpson, and others; an analogy which was, to a great extent, based on erroneous conceptions of what took place, since they conceived that the whole interior of the uterus was bared after delivery. It is now well known that that is not the case; but the fact remains that at the placental site, at any rate, there are open vessels through which absorption may readily take place. That absorption of septic material occurs through this channel is probable in certain cases in which decomposing materials exist in the interior of the uterus, especially when, from defective uterine contraction, the venous sinuses are abnormally patulous, and are not occluded by thrombi. It is difficult to understand how septic matter, introduced from without, can reach the placental site. Other sites of absorption are, however, always available. These exist in every case in the form of slight abrasions or lacerations about the cervix, or in the vagina, or, especially in primiparæ, about the fourchette and perinæum, which rarely escape intact. There is even some reason to think that absorption of septic matter may take place through the mucous membrane of the vagina or cervix without any breach of surface. This might serve to account for the occasional, although rare, cases, in which symptoms of the disease develop themselves before delivery, or so soon after

Channels through which septic matter may be absorbed.

¹ *Clinical Transactions*, vol. viii. p. cviii.

it as to show that the infection must have preceded labour; nor is there any inherent improbability in the supposition that septic material may be occasionally absorbed through the unbroken mucous membrane, as is certainly the case with some poisons, for example that of syphilis. Hence there is no difficulty in recognising the similarity of a lying-in woman to a patient suffering from a recent surgical lesion, or in understanding how septic matter conveyed to her, during or shortly after labour, may be absorbed. It is necessary, however, to suppose that absorption takes place immediately or very shortly after these lesions of continuity are formed, for it is well known that the power of absorption is arrested after they have commenced to heal. This fact may explain the cases in which sloughing about the perinæum or vagina exists without any septicæmia resulting, or the far from uncommon cases, in which an intensely fetid lochial discharge may be present a few days after delivery, without any infection taking place.

The character and origin of septic matter is often obscure.

Division into auto-genetic and hetero-genetic cases.

Sources of self-infection.

The character and sources of the septic matter constitute one of the most obscure questions in connection with septicæmia, and that which is most open to discussion.

The most practical division of the subject is into cases in which the septic matter originates within the patient, so that she infects herself, the disease then being properly *auto-genetic*; and into those in which the septic matter is conveyed from without, and brought into contact with absorptive surfaces in the generative tract, the disease then being *hetero-genetic*.

The sources of auto-infection may be various, but they are not difficult to understand. Any condition giving rise to decomposition, either of the tissues of the mother herself, of matters retained in the uterus or vagina that ought to have been expelled, or decomposing matter derived from a putrid foetus, may start the septicæmic process. Thus it may happen that, from continuous pressure on the maternal soft parts during labour, sloughing has set in; or there may be already decomposing material present from some previous morbid state of the genital tracts, as in carcinoma. A more common origin is the retention of coagula, or of small portions of membrane, or of placenta in the interior of the uterus,

which have putrefied from the access of air through the vagina; or in the decomposition of the lochia. The reason why self-infection does not more often occur from such sources, since more or less decomposition is of necessity so often present, has already been referred to in the fact that absorption of such matters is not apt to occur when the lesions of continuity, always existing after parturition, have commenced to heal. This observation may also serve to explain how previous bad states of health, by interfering with the healthy reparative processes occurring after delivery, may predispose to self-infection. It is interesting to note that puerperal septicæmia, arising from such sources, is not limited to the human race. In the debate on pyæmia at the Clinical Society Mr. Hutchinson records several well-marked examples occurring in ewes, in whose uteri portions of retained placenta were found.

The sources of septic matter conveyed from without are much more difficult to trace, and there are many facts connected with heterogenetic infection which are very difficult to reconcile with theory, and of which, it must be admitted, we are not yet able to give a satisfactory explanation. It is probable that any decomposing organic matter may infect, but that some forms operate with more certainty and greater virulence than others.

Source of heterogenetic infection.

Any decomposing organic matter may infect.

One of these, which has attracted special attention, is what may be termed cadaveric poison, derived from dissection of the dead subject in the anatomical and post-mortem theatre, and conveyed to the genital tract by the hands of the accoucheur. Attention was particularly directed to this source of infection by the observations of Semmelweis, who showed that in the division of the Vienna Lying-in Hospital attended by medical men and students who frequented the dissecting-rooms, the mortality was seldom less than 1 in 10, while in the division solely attended by women, the mortality never exceeded 1 in 34; the number of deaths in the former division at once falling to that of the latter, as soon as proper precautions and means of disinfection were used. Many other facts of a like nature have since been recorded, which render this origin of puerperal septicæmia a matter of certainty. An interesting example is related by Simpson with characteristic candour:—‘In 1836 or

Influence of cadaveric poison.

1837 Mr. Sidey of this city had a rapid succession of five or six fatal cases of puerperal fever in his practice, at a time when the disease was not known to exist in the practice of any other practitioners in the locality. Dr. Simpson, who had then no firm or proper belief in the contagious propagation of puerperal fever, attended the dissection of two of Mr. Sidey's patients, and freely handled the diseased parts. The next four cases of midwifery which Dr. Simpson attended were all affected with puerperal fever, and it was the first time he had seen it in practice. Dr. Patterson of Leith examined the ovaries, &c. The three next cases which Dr. Patterson attended in that town were attacked with the disease.¹ Negative examples are of course brought forward of those who have attended post-mortem examinations without injury to their obstetric patients, which merely prove that the cadaveric poison does not, of necessity, attach itself to the hands of the dissector, and no amount of such testimony can invalidate such positive evidence as that just narrated. Barnes believes that there is not so much danger in attending the dissection of patients who have died of any ordinary disease, but that the risk attending the dissection of those who have died of infectious or contagious complaints is very great indeed.² I presume there is no doubt that the risk is greater when the subject has died from zymotic disease; but the distinction is too delicate to rely on, and the attendant on midwifery will certainly err on the safe side by avoiding, as much as possible, having anything to do with the conduct of dissections or post-mortem examinations.

Infection
from ery-
sipelas.

Experi-
ence in the
lying-in
ward at
King's
College
Hospital.

Another possible source of infection is erysipelatous disease in all its forms. The intimate connection between erysipelas and surgical pyæmia has long been recognised by surgeons, and the influence of erysipelas in producing puerperal septicæmia has been especially observed in surgical hospitals in which lying-in patients were also admitted. Trousseau relates instances of this kind occurring in Paris. The only instance that I know of in London was in the lying-in ward of King's College Hospital, where, in spite of every hygienic precaution, the mortality was so great as to necessitate the

¹ *Selected Obstet. Works*, p. 508.

² 'Lectures on Puerperal Fever,' *Lancet*, vol. ii. 1865.

closure of the ward. Here the association of erysipelas with puerperal septicæmia was again and again observed; the latter proving fatal in direct proportion to the prevalence of the former in the surgical wards. The dependence of the two on the same poison was in one instance curiously shown by the fact of the child of a patient who died of puerperal septicæmia, dying from erysipelas which started from a slight abrasion produced by the forceps. But the connection between erysipelas and puerperal septicæmia is not limited to hospitals, having been often observed in domiciliary practice. Some interesting facts have been collected by Dr. Minor,¹ who has shown that the two diseases have frequently prevailed together in various parts of the United States, and that during a recent outbreak of puerperal fever in Cincinnati, it occurred chiefly in the practice of those physicians who attended cases of erysipelas. Many children also died from erysipelas, whose mothers had died from puerperal fever.

Connection of the two diseases observed in America.

There is good reason to believe that the contagium of other zymotic diseases may produce a form of disease indistinguishable from ordinary puerperal septicæmia, and presenting none of the characteristic features of the specific complaint from which the contagium was derived. This is admitted to be a fact by the majority of our most eminent British obstetricians, although it does not seem to be allowed by Continental authorities, and it is strongly controverted by some writers in this country. It is certainly difficult to reconcile this with the theory of septicæmia, and we are not in a position to give a satisfactory explanation of it. I believe, however, that the evidence in favour of the possibility of puerperal septicæmia originating in this way is too strong to be assailable.

Infection from other zymotic diseases.

This origin of puerperal septicæmia is denied by many.

The scarlatinal poison is that regarding which the greatest number of observations have been made. Numerous cases of this kind are to be found scattered through our obstetric literature, but the largest number are to be met with in a paper by Dr. Braxton Hicks in the 12th volume of the 'Obstetrical Transactions,' and they are especially valuable from that gentleman's well-known accuracy as a clinical observer. Out of 68 cases of puerperal disease seen in consultation, no less than 37 were distinctly traced to the

Evidence in its favour; cases produced by the contagion of scarlet fever.

¹ *Erysipelas and Childbed Fever.* Cincinnati, 1874.

scarlatinal poison. Of these 20 had the characteristic rash of the disease; but the remaining 17, although the history clearly proved exposure to the contagium of scarlet fever, showed none of its usual symptoms, and were not to be distinguished from ordinary typical cases of the so-called puerperal fever. On the theory that it is impossible for the specific contagious diseases to be modified by the puerperal state, we have to admit that one physician met with 17 cases of puerperal septicæmia in which, by a mere coincidence, the contagium of scarlet fever had been traced, and that the disease nevertheless originated from some other source, an hypothesis so improbable, that its mere mention carries its own refutation.

Cases produced by the contagion of other zymotic diseases.

With regard to the other zymotic diseases the evidence is not so strong; probably from the comparative rarity of the diseases. Hicks mentions one case in which the diptheritic poison was traced, although none of the usual phenomena of the disease were present. I lately saw a case in which a lady, a few days after delivery, had a very serious attack of septicæmia, without any diptheritic symptoms, her husband being at the same time attacked with diptheria of a most marked type. Here it would be difficult not to admit the dependence of the two diseases on the same poison.

The zymotic diseases are not always modified in the puerperal state.

Probable explanation of this fact.

It is, however, certain that all the zymotic diseases may attack a newly delivered woman, and run their characteristic course without any peculiar intensity. Probably most practitioners have seen cases of this kind; and this is precisely one of the points of difficulty which we cannot at present explain, but on which future research may be expected to throw some light. It seems to me not improbable that the explanation of the fact that zymotic poison may in one puerperal patient run its ordinary course, and in another produce symptoms of intense septicæmia, may be found in the channel of absorption. It is at any rate comprehensible that if the contagium be absorbed through the skin or the ordinary channels, it may produce its characteristic symptoms, and run its usual course; while if brought into contact with lesions of continuity in the generative tract, it may act more in the way of septic poison, or with such intensity that its specific symptoms are not developed.

It may reasonably be objected that if puerperal and

surgical septicæmia be identical, the zymotic poisons ought to be similarly modified when they infect patients after surgical operations. The subject of specific contagium as a cause of surgical pyæmia has been so little studied, that I do not think anyone would be justified in asserting that such an occurrence is not possible.¹ Mr. Spencer Wells informs me that he has seen cases of surgical pyæmia, which he had reason to believe originated in the scarlatinal poison; and his well known success as an ovariologist is, no doubt, in a great measure to be attributed to his extreme care in seeing that no one, likely to come in contact with his patients, has been exposed to any such source of infection.

Can surgical pyæmia be produced in this way?

The last source from which septic matter may be conveyed is from a patient suffering from puerperal septicæmia, a mode of origin which has, of late, attracted special attention. That this is the explanation of the occasional endemic prevalence of the disease in lying-in hospitals can scarcely be doubted. The theory of a special puerperal miasm pervading the hospital is not required to account for the facts, for there are a hundred ways, impossible to detect or avoid—on the hands of nurses or attendants, in sponges, bed-pans, sheets, or even suspended in the atmosphere—in which septic material, derived from one patient, may be carried to another.

Septicæmia from contagion conveyed from other puerperal patients.

That the poison may be conveyed, in the same manner, from one private patient to another is also beyond any doubt. Of this there are many lamentable instances recorded. Thus it was mentioned by a gentleman at the recent discussion at the Obstetrical Society, that 5 out of 14 cases he attended died, no other practitioner in the neighbourhood having a case. This origin of the disease was clearly pointed out by Gordon² towards the end of last century, who states that he himself 'was the means of carrying the infection to a great number of women,' and he also traced the disease in the same way in the practice of certain midwives. In some remarkable instances the unhappy property of carrying con-

¹ Since the above was written I have seen a paper by Sir James Paget, in his recently published *Clinical Lectures*, which seems to point to the possibility of such modification. He says, 'I think it not improbable that, in some cases, results occurring with obscure symptoms, within two or three days after operations, have been due to the scarlet-fever poison, hindered in some way from its usual progress.'

² See *Lectures on Puerperal Fever*. By Robert J. Lee, M.D.

tagion has clung to individuals in a way which is most mysterious, and which has led to the supposition that the whole system becomes saturated with the poison. One of the strangest cases of this kind was that of Dr. Rutter, of Philadelphia, which caused much discussion. He had 45 cases of puerperal septicæmia in his own practice in one year, while none of his neighbours' patients were attacked. Of him it is related, 'Dr. Rutter, to rid himself of the mysterious influence which seemed to attend upon his practice, left the city for ten days, and before waiting on the next parturient case had his hair shaved off, and put on a wig, took a hot bath, and changed every article of his apparel, taking nothing with him that he had worn or carried to his knowledge on any former occasion: and mark the result. The lady, notwithstanding that she had an easy parturition, was seized the next day with childbed fever, and died on the eleventh day after the birth of the child. Two years later he made another attempt at self-purification, and the next case attended fell a victim to the same disease.' No wonder that Meigs, in commenting on such a history, refused to believe that the doctor carried the poison, and rather thought that he was 'merely unhappy in meeting with such accidents through God's providence.' It appears, however, that Dr. Rutter was the subject of a form of ozæna, and it is quite obvious that, under such circumstances, his hands could never have been free from septic matter.¹ This observation is of peculiar interest as showing that the sources of infection may exist in conditions difficult to suspect and impossible to obviate, and it affords a satisfactory explanation of a case which was for years considered puzzling in the extreme. It is quite possible that other similar cases, of which many are on record, although none so remarkable, may possibly have depended on some similar cause personal to the medical attendant.

The sources of septic poison being thus multifarious, a few words may be said as to the mode in which it may be conveyed to the patient.

Mode in
which the

As on the view of puerperal septicæmia which seems most to agree with recorded facts, the poison, from whatever source

¹ This is stated on the authority of an obstetrical contemporary of Dr. Rutter. See *Amer. Journ. of Med. Sciences*, April 1875, p. 474.

it may be derived, must come into actual contact with lesions of continuity ■ the generative tract, it is obvious that one method of conveyance may be on the hands of the accoucheur. That this is a possibility, and that the disease has often been unhappily conveyed in this way, no one can doubt. Still it would be unfair in the extreme to conclude that this is the only way in which infection may arise. In town practice, especially, there are many other ways in which septic matter may reach the patient. The nurse may be the means of communication, and, if she have been in contact with septic matter, she is even more likely than the medical attendant to convey it when washing the genitals during the first few days after delivery, the time that absorption is most apt to occur. Barnes relates a whole series of cases occurring in a suburb of London, in the practice of different practitioners, every one of which was attended by the same nurse. Again it is very probable that septic matter may be carried in sponges, linen, and other articles. What is more likely, for example, than that a careless nurse might use an imperfectly washed sponge, on which discharge has been allowed to remain and decompose? Nor do I see any reason to question the possibility of infection from septic matter suspended in the atmosphere; and in lying-in hospitals, where many women are congregated together, there can be little doubt that this is a common origin of the disease. It is certain, whatever view we may take of the character of the septic material, that it must be in a state of very minute sub-division, and there is no theoretical difficulty in the assumption of its being conveyed by the atmosphere.

poison
may be
conveyed
to the
patient.

This question naturally involves a reference to the duty of those who are unfortunately brought into contact with septic matter in any form, either in a patient suffering from puerperal septicæmia, zymotic disease, or offensive discharges. The practitioner cannot always avoid such contact; and it is practically impossible, as Dr. Duncan has insisted, to relinquish obstetric work every time that he is in attendance on a case from which contagion may be carried. Nor do I believe, especially in these days when the use of antiseptics is so well understood, that it is essential. It was otherwise when antiseptics were not employed; but I can scarcely conceive

Conduct of
the prac-
titioner in
relation to
the dis-
ease.

Importance of antiseptic precautions.

any case in which the risk of infection cannot be prevented by proper care. The danger I believe to be chiefly in not recognising the possible risk, and in neglecting the use of proper precautions. It is impossible, therefore, to urge too strongly the necessity of extreme and even exaggerated care in this direction. The practitioner should accustom himself, as much as possible, to use the left hand only in touching patients suffering from infectious diseases, as that which is not used, under ordinary circumstances, in obstetric manipulations. He should be most careful in the frequent employment of antiseptics in washing his hands, such as Condy's fluid, carbolic acid, or tincture of iodine. Clothing should be changed on leaving an infectious case. Much more care than is usually practised should be taken by nurses, especially in securing perfect cleanliness in everything brought into contact with the patient. When, however, a practitioner is in actual and constant attendance on a case of puerperal septicæmia, when he is visiting his patient many times a day, especially if he be himself washing out the uterus with antiseptic lotions, as it is frequently advisable for him to do, it is certain that he cannot deliver other patients with safety, and he should secure the assistance of a brother practitioner, although there seems no reason why he should not visit women already confined, in whom he has not to make vaginal examinations.

Nature of the septic poison.

As to the precise character of the septic poison—although of late much has been said about it, and there is good reason to believe that further research may throw light on this obscure subject—too little is known to justify any positive statement. With regard to the influence of the minute organisms known as bacteria, and their supposed connection with the production of the disease, this is especially the case. Heiberg has proved that they may be traced, in most cases of puerperal septicæmia, passing through the veins and lymphatics, and that they are found in various organs and pathological products. But what their relation is to the disease, whether they themselves form the septic matter, or carry it, or whether they are mere accidental concomitants of the pyæmic process, it is impossible, in the present state of our knowledge, to state; and I therefore prefer to dwell on that part of the subject which is

clinically of importance, rather than enter into speculative theories, which may to-morrow prove to be valueless.

Passing on to the channels of diffusion through which the septic matter may act, we have to consider its effects on the structures with which it is brought into contact, and the mode in which it may infect the system at large; and this will include a consideration of the pathological phenomena.

Local changes consequent on the absorption of the poison are pretty constant, and of these we may form an intelligible idea by thinking of them as similar in character and causation to those which we have the opportunity of studying when septic matter is applied to a wound open to observation, as, for example, in cases of blood-poisoning following a dissection wound. Distinct traces of local action are not of invariable occurrence, and in some of the worst class of cases, when the amount of septic matter is great, and its absorption rapid, death may occur after an illness of short duration but great intensity, and before appreciable local changes, either at the site of absorption or in the system at large, have had time to develop themselves. The fact that puerperal fever may prove fatal, without leaving any tangible post-mortem signs, has often been pointed out, such cases most frequently occurring during the endemic prevalence of the disease in lying-in hospitals. There can be little doubt, however, that in such cases of intense septicæmia marked pathological changes exist, in the form of alterations of the blood and degenerations of tissue, but not of a character which can be detected by an ordinary post-mortem examination. In the great majority of cases, indications of the disease exist at the sites of absorption. These are described by pathologists as identical in their character with the inflammatory œdema which occurs in connection with phlegmonous erysipelas. If lacerations exist in the cervix or vagina they take on unhealthy action, their edges swell, and their surfaces become covered with a yellowish coat, similar in appearance to diphtheritic membrane. The mucous membrane of the uterus is also generally found to be affected, and in a degree varying with the intensity of the local septic process. There is evidence of severe endometritis; and, very frequently, the whole lining of the uterus is profoundly altered, softened, covered with patches of diphtheritic deposit, and it may be in a

Channels
of diffu-
sion.

Local
changes
resulting
from ab-
sorption of
septic ma-
terial.

These are
not always
present.

Nature of
local
changes
generally
observed.

state of general necrosis. In the severer cases these changes affect the muscular tissue of the uterus, which is found to be swollen, soft, imperfectly contracted, and even partially necrosed, a condition which is likened by Heiberg to hospital gangrene. The connective tissue surrounding the generative tract is also swollen and œdematous, and the inflammation may in this way reach the peritoneum, although peritonitis, so often observed in puerperal septicæmia, does not necessarily depend on the direct transmission of inflammation from the pelvic connective tissue, but is more often a secondary phenomenon.

Channels through which systemic infection is produced.

Absorption through the lymphatics.

The channels through which general systemic infection may supervene are the lymphatics and the venous sinuses, the former being by far the most important. Recent researches have shown the great number and complexity of the lymphatics in connection with the pelvic viscera, and marked traces of the absorption of septic matter are almost always to be found, except in those very intense cases already alluded to, in which no appreciable post-mortem signs are discoverable. The septic matter is probably absorbed from the lymph spaces abounding in the connective tissue, and carried along the lymphatic canals to the nearest glands. The result is inflammation of their coats, and thrombosis of their contents, which may be seen on section as a creamy purulent substance. The absorption of septic material may, as Virchow has shown, be delayed by the local changes produced in the lymphatics and in the glands with which they communicate, which are, therefore, conservative in their action; and the farther progress of the case may in this way be stopped, and local inflammation alone result, such cases being believed by Heiberg to be examples of abortive pyæmia. On the other hand the free septic material may be too abundant and intense to be so arrested, it may pass on through the lymph canals and glands, until it reaches the blood current through the thoracic duct, and so produces a general blood infection. This mode of absorption of septic matter, and the tendency of the glands to arrest its further progress, serve to explain the progressive character of many cases, in which fresh exacerbations seem to occur from time to time; since fresh quantities of poison, generated at its source of origin, may be absorbed as the case

progresses. The uterine veins are supposed by D'Espinne to be the channel of absorption in the intense form of disease which proves fatal very shortly after delivery, too soon for the more gradual process of lymphatic absorption to have become established. It is evident that the veins are not likely to act in this way, since they must, under ordinary circumstances, be completely occluded by thrombi, otherwise hæmorrhage would occur. If, however, uterine contraction be incomplete, the occlusion of the venous sinuses may be imperfect, and absorption of septic material through them may then take place. Some writers have laid great stress on imperfect uterine contraction in predisposing to septicæmia, and its influence may thus be well explained. The veins may bear an important part in the production of septicæmia, independent of the direct absorption of septic matter through them, by means of the detachment of minute portions of their occluding thrombi, in the form of emboli. If phlegmenous inflammation occur in the immediate vicinity of the veins, the thrombi they contain may become infected. When once blood infection has occurred, by any of these channels, general septicæmia, the so called puerperal fever, is developed.

Absorption
through
the veins.

Detach-
ment of
emboli
from
thrombi
contained
in the
veins.

The variety of pathological phenomena found on post-mortem examination has had much to do with the prevalent confusion as to the nature of the disease. This has resulted in the description of many distinct forms of puerperal fever; the most marked pathological alteration having been taken to be the essential element of the disease. As a matter of fact there is no doubt that various types of pathological change are met with. Heiberg describes four chief classes which are by no means distinctly separated from one another, are often found simultaneously in the same subject, and are certainly not to be distinguished by the symptoms during life.

Patholo-
gical
phenomena
observed
after gene-
ral blood
infection.

Four prin-
cipal types
of patho-
logical
changes.

Of these, the first is the class of cases in which no appreciable morbid phenomena are found after death. This formidable and fatal form of the disease has long been well known; and is that described by some of our authors as adynamic, or malignant puerperal fever. It is the variety which was so prevalent in our lying-in hospitals, and which Ramsbotham talks of as being second only to cholera in

Intense
cases with-
out marked
post-
mortem
signs.

the severity and suddenness of its onset, and in the rapidity with which it carried off its victims. It is quite erroneous to suppose that the existence of pathological changes in this form of disease has never been recognised. Even with the coarse methods of examination formerly used, the occurrence of a fluid and altered state of the blood, and ecchymoses in connection with various organs—especially the lungs, spleen, and kidneys—were noticed and specially described by Copland in his dictionary of medicine. More recently it has been clearly proved by the microscope that there exist in addition, the commencement of inflammation in most of the tissues, as shown by cloudy swellings, and granular infiltration and disintegration of the cell elements; proving that the blood, heavily charged with septic matter, had set up morbid action wherever it circulated, the patient succumbing before this had time to develop.

Cases characterised by inflammation of the serous membranes.

In the second type, and that perhaps most commonly met with, the morbid changes are most frequently found in the serous membranes, in the pleura, the pericardium, but, above all, in the peritoneum, the alterations in which have long attracted notice, and have been taken by many writers as proving peritonitis to be the main element of the disease. Evidences of more or less peritonitis are very general. In the more severe cases there is little or no exudation of plastic lymph, such as is found in peritonitis unassociated with septicæmia. There is a greater or less quantity of brownish serum only, the coils of intestine, distended with flatus, and highly congested, being surrounded by it. More often there are patchy deposits of fibrinous exudation over many of the viscera, the fundus uteri, the under surface of the liver, and the distended intestines. There is then also a considerable quantity of sero-purulent fluid in the abdominal cavity. The pleural cavities may also exhibit similar traces of inflammatory action, containing imperfectly organised lymph, and sero-purulent fluid. Schröder states that pleurisy is more often the direct result of transmission of inflammation through the substance of the diaphragm or lung, than a secondary consequence of the septicæmia. In like manner evidences of pericarditis may exist, the surface of the pericardium being highly injected, and its cavity containing serous fluid. Inflammation of the synovial membranes of the larger joints,

occasionally ending in suppuration, is not uncommon, and may probably be best included under this class of cases.

In the third type the mucous membranes appear to bear the brunt of the disease. The pathological changes are most marked in the mucous membranes lining the intestines, which is highly congested and even ulcerated in patches, with numerous small spots of blood extravasated in the sub-mucous tissue. Similar small apoplectic effusions have been observed in the substance of the kidneys, and under the mucous membrane of the bladder. Pneumonia is of common occurrence. In most cases it is probably secondary to the impaction of minute emboli in the smaller branches of the pulmonary artery; but it may doubtless arise from independent inflammation of the lung tissue, and will then be included in the class of cases now under consideration.

Cases characterised by changes in the mucous membranes.

The fourth class of pathological phenomena are those which are produced chiefly by the impaction of minute infected emboli in small vessels in various parts of the body. These are the cases which most closely resemble surgical pyæmia, both in their symptoms and post-mortem signs, and which by many writers are described under the name of puerperal pyæmia. The dependence of puerperal fever on phlebitis of the uterine veins was a favourite theory, and in a large proportion of cases the coats of the veins show signs of inflammation, their canals being occupied with thrombi in a more or less advanced state of disintegration. The mode in which these thrombi may become infected has been shown by Babnoff, who has proved that leucocytes may penetrate the coats of the vein, and, entering its contained coagulum, may set up disintegration and suppuration. This observation brings these pyæmic forms of disease into close relation with septicæmia, such as we have been studying, and justifies the conclusion of Verneuil that purulent infection is not a distinct disease, but only a termination of septicæmia, with which it ought to be studied. We have, moreover, to differentiate these results of embolism from those considered in a subsequent chapter; the characteristic of these cases being the infected nature of the minute emboli. Localised inflammations and abscesses, from the

Cases characterised by the impaction of infected emboli and secondary inflammation and abscess.

impaction of minute capillary emboli, are found in many parts of the body; most frequently in the lungs, then in the kidneys, spleen, and liver, and also in the muscles and connective tissues. Pathologists are by no means agreed as to the invariable dependence of these on embolism, nor is it possible to prove their origin from this source by post-mortem examination. Some attribute all such cases to embolism, others think that they may be the results of primary septicæmic inflammation. It has been proved by Weber that minute infected emboli may pass through the lung capillaries; and this disposes of one argument against the embolic theory, based on the supposed impossibility of their passage. It is probable that both causes may operate, and that localised inflammations occurring a short time after delivery are directly produced by the infected blood, while those occurring after the lapse of some time, as in the second or third week, depend upon embolism.

Descrip-
tion of the
disease.

From what has been said as to the mode of infection in puerperal septicæmia, and as to the very various pathological changes which accompany it, it will not be a matter of surprise to find that the symptoms are also very various in different cases. This can readily be explained by the amount and virulence of the poison absorbed, the channels of infection, and the organs which are chiefly implicated; but it renders it very difficult to describe the disease satisfactorily.

Symptoms
generally
show them-
selves
within a
few days
after de-
livery.

The symptoms generally show themselves within two or three days after delivery. As infection most often occurs during labour, or, in cases which are autogenetic, within a short time afterwards, and before the lesions of continuity in the generative tract have commenced to cicatrise, it can be understood why septicæmia rarely commences later than the fourth or fifth day.

The early
symptoms
are not
well
marked.

In the great majority of cases the disease begins insidiously. There are, generally, some chilliness and rigor, but by no means always, and even when present they frequently escape observation, or are referred to some transient cause. The first symptom which excites attention is a rise in the pulse, which may vary from 100 to 140 or more, according to the severity of the attack; and the thermometer will also

show that the temperature is raised to 102° , or, in bad cases, even to 104° or 106° . Still, it must be borne in mind that both the pulse and temperature may be increased in the puerperal state from transient causes, and do not, of themselves, justify the diagnosis of septicæmia.

In the more intense class of cases, in which the whole system seems overwhelmed with the severity of the attack, the disease progresses with great rapidity, and often without any appreciable indication of local complication. The pulse very rapid, small, and feeble, varying from 120° to 140° , and there is generally a temperature of 103° or 104° . There may be little or no pain, or there may be slight tenderness on pressure over the abdomen or uterus; and, as the disease progresses, the intestines get largely distended with flatus, so that intense tympanites often forms a most distressing symptom. The countenance is sallow, sunken, and has a very anxious expression. As a rule, intelligence is unimpaired, and this may be the case even in the worst forms of the disease, and up to the period of death. At other times, there is a good deal of low muttering delirium, which often occurs at night alone, and alternates with intervals of complete consciousness, but is occasionally intensified, for a short time, into a more acute form. Diarrhœa and vomiting are of very frequent occurrence; by the latter dark, grumous, coffee-ground substances are ejected. The diarrhœa is occasionally very profuse and uncontrollable; in milder cases it seems to relieve the severity of the symptoms. The tongue is moist and loaded with sordes; but sometimes it gets dark and dry, especially towards the termination of the disease. The lochia are generally suppressed, or altered in character, and sometimes they have a highly-offensive odour, especially when the disease is autogenetic. The breathing is hurried and panting, and the breath itself has a very characteristic, heavy, sweetish odour. The secretion of milk is often, but not always, arrested.

Symptoms
of intense
septicæmia.

With more or less of these symptoms the case goes on; and when it ends fatally it generally does so within a week, the fatal termination being indicated by more weakness, rapid, threadlike, or intermittent pulse, marked delirium, great tympanites, and sometimes a sudden fall of temperature,

Duration
of the
disease;
symptoms
indicating
death.

until at last the patient sinks with all the symptoms of profound exhaustion.

Variety of
symptoms
in different
cases.

In milder cases similar symptoms, variously modified and combined, are present. It is seldom that two precisely similar cases are met with; in some, the rapid, weak pulse is most marked; in others, abdominal distension, vomiting, diarrhœa, or delirium.

Symptoms
of perito-
nitis.

Local complications variously modify the symptoms and course of the disease. The most common is peritonitis, so much so that with some authors puerperal fever and puerperal peritonitis are synonymous terms. Here the first symptom is severe abdominal pain, commencing at the lower part of the abdomen, where the uterus is felt enlarged and tender. As the abdominal pain and tenderness spread, the sufferings of the patient greatly increase, the intestines become enormously distended with flatus, and the breathing is entirely thoracic, in consequence of the upward displacement of the diaphragm, and the fact that the abdominal muscles are instinctively kept as much in repose as possible. The patient lies on her back, with her knees drawn up, and sometimes cannot bear the slightest pressure of the bed-clothes. There is generally much vomiting, and often severe diarrhœa. The temperature generally ranges from 102° to 104° , or even 106° , and is subject to occasional exacerbations and remissions, possibly depending on fresh absorption of septic matter. The case generally lasts for a week or more, the symptoms going on from bad to worse, and the patient dying exhausted. D'Espinne points out that rigors, with exacerbations of the general symptoms, not unfrequently occur about the sixth or seventh day, which he attributes to fresh systemic infection, from foetid pus in the peritoneal cavity. It must not be supposed that all these symptoms are necessarily present when the peritonic complication exists. Pain especially is often entirely absent, and I have seen cases in which post-mortem examination proved the existence of peritonitis in a very marked degree, in which pain was entirely absent. Sometimes the pain is only slight, and amounts to little more than tenderness over the uterus.

Pain is
not always
present.

Other local complications are characterised by their

own special symptoms; thus pneumonia by dyspnea, cough, dulness, &c.; pericarditis by the characteristic rub; pleurisy by dulness on percussion; kidney affection by albuminuria and the presence of casts; liver complication by jaundice; and so on.

Symptoms
of other
local com-
plications.

The course of the disease is not always so intense and rapid, being, in some cases, of a more chronic character. The symptoms in the early stage are often indistinguishable from those already described; and it is generally only after the second week, that indications of purulent infection develop themselves. Then we often have recurrent and very severe rigors, with marked elevations and remissions of temperature. At the same time there is generally an exacerbation of the general symptoms, a peculiar yellowish discolouration of the skin, and occasionally well developed jaundice, while transient patches of erythema are not uncommonly observed on various parts of the skin. Localised inflammations and suppuration may rapidly follow. Amongst the most common is suppuration of the joints—the knees, shoulders, or hips—which is preceded by difficulty of movement, swelling, and very acute pain. Large collections of pus in various parts of the muscles and connective tissues are not rare. Suppurative inflammation may also be found in connection with many organs, as in the eye, in the pleura, pericardium, or lungs; each of which will, of course, give rise to characteristic symptoms, more or less modified by the type of the disease and the intensity of the inflammation.

Pyæmic
forms of
the dis-
ease.

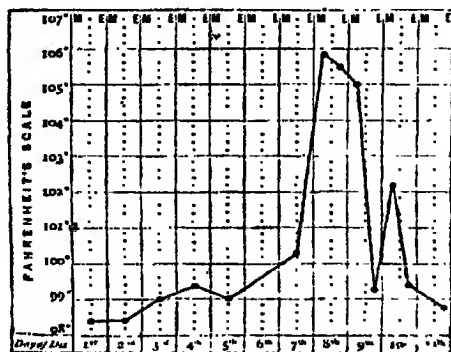
In considering the all-important subject of treatment, the views of the practitioner are naturally biassed by the theory he has adopted of the nature of the disease. If that here inculcated be correct, the indications we have to bear in mind are: 1st, to discover, if possible, the source of the poison, in the hope of arresting further septic absorption; 2nd, to keep the patient alive until the effects of the poison are worn off; and 3rd, to treat any local complications that may arise.

Treatment.

The first is likely to be of great importance in cases of self-infection in which the source of mischief still exists, from which fresh quantities of septic matter may be, from time to time, absorbed. We, fortunately, are in possession

The use of
antiseptic
injections.

of a powerful means of fulfilling this indication by the application of antiseptics to the interior of the uterus, and to the canal of the vagina. This is especially valuable when the existence of decomposing coagula, or other source of septic matter, is suspected in the uterine cavity, or when offensive discharges are present. Disinfection is readily accomplished by washing out the uterine cavity, once or twice a day, by means of a Higginson's syringe with a long vaginal pipe attached. The results are sometimes very remarkable, the threatening symptoms rapidly disappearing, and the temperature and pulse falling so soon after the use of the antiseptic injections, as to leave no doubt of the beneficial effects of the treatment. I cannot better illustrate the advantages of this treatment than by the accompanying temperature chart, which is from a case which recently came



under my observation in the out-door practice of King's College Hospital. It was that of a healthy woman, thirty-six years of age, who had an easy and natural labour. Nothing remarkable was observed until the 3rd day after delivery, when the temperature was found to be slightly increased. On the morning of the 8th day the temperature had risen to 105.4°. She was delirious, with a rapid, thready pulse, clammy perspiration, tympanitic abdomen, and her general condition indicated the most urgent danger. On vaginal examination a piece of compressed and putrid placenta was found in the os. This was removed by my colleague, Dr. Hayes, and the uterus thoroughly washed out with Condy's fluid and water. The same evening the temperature

had sunk to 99°, and the general symptoms were much improved. The next day there was a slight return of offensive discharge, and an aggravation of the symptoms. After again washing out the uterus the temperature fell, and from that date the patient convalesced without a single bad symptom.

This is a very well-marked example of the value of local antiseptic treatment, and I have seen many cases of the same kind. It should, therefore, never be omitted in all cases in which self-infection is possible; and, indeed, even when there is no reason to suspect the presence of a local focus of infection, the use of antiseptic lotions is advisable, as a matter of precaution, since it can do no harm, and is generally comforting to the patient. Any antiseptic may be used, such as a weak solution of carbolic acid, or of tincture of iodine. There is none, however, which answers better than Condyl's fluid largely diluted. The nozzle of the syringe should be guided well through the cervix, and the cavity of the uterus thoroughly washed out, until the fluid that issues from the vagina is no longer discoloured. As the os is always patulous, there is no risk of producing the troublesome symptoms of uterine colic which occasionally follow the use of intra-uterine injections in the unimpregnated state. It is quite useless to entrust the injection to the nurse, and it should be performed at least twice daily by the practitioner himself, in all cases in which the discharges are offensive.

In a disease characterised by so marked a tendency to prostration, the importance of sustaining the vital powers by an abundance of easily assimilated nourishment cannot be over-rated. Strong beef tea, or other form of animal soup, milk, alone or mixed either with lime or soda water, and the yolk of eggs, beat up with milk and brandy, should be given at short intervals, and in as large quantities as the patient can be induced to take; and the value of thoroughly efficient nursing will be specially apparent in the management of this important part of the treatment. As there is frequently a tendency to nausea, the patient may resist the administration of food, and the resources of the practitioner will be taxed in administering it in such form and variety as will

Adminis-
tration of
food and
stimulants.

prove least distasteful. Generally speaking, not more than one or two hours should be allowed to elapse without some nutriment being given. The amount of stimulant required will vary with the intensity of the symptoms, and the indications of debility. Generally, stimulants are well borne, prove decidedly beneficial, and require to be given pretty freely. In cases of moderate severity a table-spoonful of good old brandy or whiskey every four hours may suffice; but when the pulse is very rapid and thready, when there is much low delirium, tympanites, or sweating (indicating profound exhaustion), it may be advisable to give them in much larger quantities and at shorter intervals. The careful practitioner will closely watch the effects produced, and regulate the amount by the state of the patient, rather than by any fixed rule; but in severe cases, eight to twelve ounces of brandy, or even more, in the twenty-four hours may be given with decided benefit.

Venesection is not admissible.

Venesection, both general and local, was long considered a sheet anchor in this disease. Modern views are, however, entirely opposed to its use; and in a disease characterised by so profound an alteration of the blood, and so much prostration, it is too dangerous a remedy to employ, although it is possible that it might alleviate temporarily the severity of some of the symptoms, especially in cases in which peritonitis is well marked, and much local pain and tenderness are present.

Medicinal treatment.

The rational indications in medicinal treatment are to lessen the force of the circulation as much as is possible without favouring exhaustion; and to diminish the temperature.

Use of arterial sedatives.

For the former purpose, Barker strongly advocates the use of *veratrum viride*, in doses of five drops of the tincture every hour, until the pulse falls to below 100, when its effects are subsequently kept up by two or three drops every second hour. Of this drug I have no personal experience; but I have extensively used minute doses of tincture of aconite for the same purpose, and, when carefully given, I believe it to be a most valuable remedy. The way I have administered it is to give a single drop of the tincture, at first every half hour, increasing the interval of administration according to

the effect produced. Generally, after giving four or five doses at intervals of half an hour, the pulse begins to fall, and afterwards a few doses, at intervals of one or two hours, will suffice to prevent the heart's action rising to its former rapidity. The advantage of thus modifying cardiac action, with the view of preventing excessive waste of tissue, cannot be questioned. It is evident that so powerful a remedy must not be used without the most careful supervision, for, if continued too long, or given at too frequent intervals, it may unduly depress the circulation, and do more harm than good. It is necessary, therefore, that the practitioner should constantly watch the effect of the drug, and stop it if the pulse become very weak, or if it intermit. It is most likely to be useful at an early stage of the disease before much exhaustion is present, and then only when the pulse is of a certain force and volume. Barker says of the *veratrum viride*, what is also true of aconite, that 'it should not be given in those cases in which rapid prostration is manifested by a feeble, thread-like, irregular pulse, profuse sweats, and cold extremities.'

Caution as to their administration.

The reduction of temperature is best obtained by quinine in tolerably large doses, of 10 to 15 grains, which may be given both morning and evening. After its exhibition the temperature frequently falls one or two degrees, and it is not common for any unpleasant head symptoms to follow its use. Much advantage may probably be derived, when the temperature is very high, from the external use of cold, either in the form of cold sponging or the wet sheet. My experience of this agent is, however, too limited to enable me to speak of it with any confidence.

Reduction of temperature.

Amongst other remedies which have been used is turpentine, which was highly thought of by the Dublin school. In cases with much tympanitic distension, and a small weak pulse, it is sometimes of unquestionable value, and it probably acts as a strong nervine stimulant. Given in doses of 15 to 20 minims, rubbed up with mucilage, it can generally be taken in spite of its nauseous taste.

Administration of turpentine.

Evacuants, in the shape of purgatives, diaphoretics, or even emetics, have often been employed as eliminants of the poison. The former are strongly recommended by

Evacuant remedies.

Schroeder and other German authorities, and in this country they were formerly amongst the most favourite remedies. In the first volume of the 'Obstetrical Journal' there is a paper by Mr. Morton, by whom this practice is strongly advocated, and some interesting cases are recorded in which it apparently acted well. He administers calomel in doses of 3 or 4 grains with compound extract of colocynth, so as to keep up a free action of the bowels. It seems quite reasonable that when there is constipation, a gentle action of the bowels should be promoted by some mild aperient; but, bearing in mind that severe and exhausting diarrhoea is a common accompaniment of the disease, I should myself hesitate to run the risk of inducing it artificially, especially as there is no proof whatever that septic matter can really be eliminated in this way.

Internal
anti-septic
remedies.

It is possible that further research will give us some means of counteracting the septic state of the blood, and the sulphites and carbolates have been recommended for this purpose, but as yet with no reliable results.

Tincture of
perchloride
of iron.

The tincture of the perchloride of iron naturally suggests itself, from its well-known effects in surgical pyæmia. In the less intense forms of the disease, especially when local suppurations exist, it is certainly useful, and may be given in doses of 10 to 20 minims every 3 or 4 hours. In very acute cases, other remedies are more reliable, and the iron has the disadvantage of not unfrequently causing nausea or vomiting.

Opiates.

When restlessness, irritation, and want of sleep are prominent symptoms, sedatives may be required. Under such circumstances opiates may be given at night, and Battley's solution, nepenthe, or the hypodermic injection of morphia, are the forms which seem to answer best.

Treatment
of local
complica-
tions.

Pain and tenderness, and local complications, must be treated on general principles. The distress from them is most experienced when peritonitis is well marked. Here warm and moist applications, in the form of poultices or fomentations, are very useful. Relief is also sometimes obtained from turpentine stupes, and, when the tympanites is distressing, turpentine enemata are very serviceable. I have found the free application over the abdomen of the

flexible collodium of the pharmacopœia, decidedly useful in allievating the suffering from peritonitis.

Such are the remedies most used in the treatment of this disease. It is needless to say that it is quite impossible to lay down fixed rules for the management of any individual case; and it is obvious that, if puerperal septicæmia be not a special and distinct disease, its judicious management must depend on the general knowledge of the attendant, and on a careful study of the symptoms each separate case presents.

CHAPTER VI.

PUERPERAL VENOUS THROMBOSIS AND EMBOLISM.

Puerperal
thrombosis
and its
results.

UNDER the head of *thrombosis* we may class several important diseases connected with the puerperal state, which have received far less attention than they deserve. It is only of late years that some, we may probably safely say the majority, of those terribly sudden deaths which from time to time occur after delivery, have been traced to their true cause, viz. obstruction of the right side of the heart and pulmonary arteries from a blood clot, either carried from a distance, or, as I shall hope to show, formed *in situ*. Although the result, and, to a great extent, the symptoms, are identical in both, still a careful consideration of the history of these two classes of cases tends to show that in their causation they are distinct, and that they ought not to be confounded together. In the former, in which the obstruction is caused by a clot carried from a distance, we have a secondary result of a clotting of blood in some part of the peripheral venous system; the separation of a portion of such a thrombus being an accident due to changes which it undergoes during retrograde metamorphosis tending to its eventual absorption. In the latter we have a local deposition of fibrine, the result of blood changes consequent on pregnancy and the puerperal state. The formation of such a coagulum in vessels, the complete obstruction of which is incompatible with life, explains the fatal results. When, however, the coagulum chances to be formed in more distant parts of the circulation, the vital functions are not immediately interfered with, and we have other phenomena occurring, due to the obstruction. The disease known as phlegmasia dolens, I shall presently attempt to show, is one of those secondary results of blood clot forming in peripheral vessels. But from the evident and tangible symptoms it produces it has long been considered an essential and special disease, and the general blood dyscrasia which produces it,

Phleg-
masia do-
lens one
conse-
quence of
peripheral
throm-
bosis.

as well as other allied states, has not been studied separately. I shall hope to show that all these various conditions, dissimilar as they at first sight appear, are very closely connected, and that they are in fact due to a common cause; and thus, I think, we shall arrive at a clearer and more correct idea of their true nature, than if we looked upon them as distinct and separate affections, as has been commonly done. I am aware that in phlegmasia dolens, the pathology of which has received perhaps more study than that of almost any other puerperal affection, something beyond simple obstruction of the venous system of the affected limb is probably required to account for the peculiar tense and shining swelling which is so characteristic. Whether this be an obstruction of the lymphatics, as Dr. Tilbury Fox and others have maintained with much show of reason, or whether it is some as yet undiscovered state, further investigation is required to show. But it is beyond any doubt that the important and essential part of the disease is the presence of a thrombus in the vessels; and I think it will not be difficult to prove that in its causation and history it is precisely similar to the more serious cases in which the pulmonary arteries are involved. It will be well to commence the study of the subject by a consideration of the conditions which, in the puerperal state, render the blood so peculiarly liable to coagulation, and we may then proceed to discuss the symptoms and results of the formation of coagula in various parts of the circulatory system.

The researches of Virchow, Benj. Ball, Humphrey, Richardson, and others, have rendered us tolerably familiar with the conditions which favour the coagulation of the blood in the vessels. These are chiefly: 1. A stagnant or arrested circulation; as, for example, as has been pointed out by Moxon,¹ when the blood coagulates in the veins which draw blood from the gluteal region in old and bedridden people, or as in some forms of pulmonary thrombosis, where the clots in the arteries are probably the result of obstruction in the circulation through the lung capillaries, as in certain cases of emphysema, pneumonia, or pulmonary apoplexy. 2. A mechanical obstruction around which coagula form, as in certain morbid states of the vessels, or a better example still,

Conditions
which
favour
thrombo-
sis.

¹ *Guy's Hospital Reports*, 1869.

secondary coagula which form around a travelled embolus impacted in the pulmonary arteries. 3. And most important of all, in which the coagulation is the result of some morbid state of the blood itself, by which the tendency to the deposition of fibrine is increased. Examples of this latter condition are frequently met with in the course of various diseases, such as rheumatism or fever, in which the quantity of fibrine is increased, and the blood itself is loaded with morbid material. Thrombosis from this cause is of by no means unfrequent occurrence after severe surgical operations, especially such as have been attended with much hæmorrhage, or when the patient is in a weak and anæmic condition. This has been specially dwelt upon as a not unfrequent source of death after operation by Fayrer and other surgeons.¹

Conditions
which fa-
vour con-
glutination in
the puer-
peral
state.

But little consideration is required to show why thrombosis plays so important a part in the puerperal state, for there most of the causes favouring its occurrence are of necessity present. Probably there is no other condition in which they exist in so marked a degree, or are so frequently combined. The blood itself contains an excess of fibrine, which largely increases towards the latter months of utero-gestation, until, as has been pointed out by Andral and Gavarret, it not unfrequently contains more than a third of the average amount present in the non-pregnant state. As soon as delivery is completed, other causes of blood dyscrasia come into operation. Involution of the largely hypertrophied uterus commences, and the blood is charged with a quantity of effete material, which must be present, in greater or less amount, until that process is completed. It is an old observation that phlegmasia dolens is of very common occurrence in patients who have lost much blood during labour; thus Dr. Leishman says: 'In no class of cases has it been so frequently observed as in women whose strength has been reduced to a low ebb by hæmorrhage either during or after labour; and this, no doubt, accounts for the observation made by Merriman that it is relatively a common occurrence after placenta prævia.'² An examination of the cases in which death results from pulmonary thrombosis shows precisely the same facts, as in a

¹ *Edin. Med. Jour.* March, 1861; *Indian Annals of Med.* July, 1867.

² *Leishman, System of Obstetrics*, p. 710.

large proportion of them severe post-partum hæmorrhage is stated to have occurred. The exhaustion following the excessive losses so common after labour must of itself strongly predispose to thrombosis, and, indeed, loss of blood has been distinctly pointed out by Richardson to be one of its most common antecedents. 'There is,' he observes, 'a condition which has been long known to favour coagulation and fibrinous deposition. I mean loss of blood, and syncope or exhaustion during impoverished states of the body.'

Since then so many of the predisposing causes of thrombosis are present in the puerperal state, it is hardly a matter of astonishment that it should be of frequent occurrence, or that it should lead to conditions of serious gravity. And yet the attention of the profession has been for the most part limited to a study of one only of the results of this tendency to blood clotting after delivery, no doubt because of its comparative frequency and evident symptoms. True the balance of professional opinion has lately held that phlegmasia dolens is chiefly the result of some morbid condition of the blood producing plugging of the veins; but the wider view which I am attempting to maintain, which would bring this disease into close relation with the more rarely observed, but infinitely important obstructions of the pulmonary arteries, has scarcely, if at all, been insisted on. Doubtless farther investigation will show that it is not in these parts of the venous system alone that puerperal thrombosis occurs; but the symptoms and effects of venous obstruction elsewhere, important though they may be, are unknown, and for the present I must content myself with dwelling on it as it occurs in them. I propose then to describe the symptoms and pathology, so far as they are yet known to us, of blood clot as it occurs in the right side of the heart and pulmonary artery. It may be useful here to repeat that this is essentially distinct from embolism of the same parts. The latter is obstruction due to the impaction of a separated portion of a thrombus formed elsewhere, and for its production it is essential that thrombosis should have preceded it. Embolism is in fact an accident of thrombosis, not a primary affection. The condition I am now discussing I hold to be primary, precisely similar in its causation to the venous obstruction which, in other situations, gives rise to phlegmasia dolens.

Distinction between thrombosis and embolism.

Is primary
thrombosis
in the
pulmonary
arteries
possible?

At the threshold of this enquiry we have to meet the objection, started by several who have written on this subject,¹ that spontaneous coagulation of the blood, in the right side of the heart and pulmonary arteries, is a mechanical and physiological impossibility. This was the view of Virchow, who, with his followers, maintained that whenever death from pulmonary obstruction occurred, an embolus was of necessity the starting-point of the malady, and the nucleus round which secondary deposition of fibrine took place. Virchow holds that the primary factor in thrombosis is a stagnant state of the blood, and that the impulse imparted to the blood by the right ventricle is of itself sufficient to prevent coagulation. It is to be observed that these objections are purely theoretical. Without denying that there is considerable force in the arguments adduced, I think that the clinical history of these cases strongly favours the view of spontaneous coagulation; and I would apply to the theoretical objections advanced the arguments used by one of their strongest upholders, with regard to another disputed point, 'Je préfère laisser la parole aux faits, car devant eux la théorie s'incline.'²

The anatomical
arrange-
ments of
the pul-
monary
arteries
favour
throm-
bosis.

The anatomical arrangement of the pulmonary arteries shows how spontaneous coagulation may be favoured in them; for, as Dr. Humphrey has pointed out,³ 'the artery breaks up at once into a number of branches, which radiate from it, at different angles, to the several parts of the lungs. Consequently, a large extent of surface is presented to the blood, and there are numerous angular projections into the currents; both which conditions are calculated to induce the spontaneous coagulation of the fibrine.' We know also, that thrombosis generally occurs in patients of feeble constitution, often debilitated by hæmorrhage, in whom the action of the heart is much weakened. These facts, of themselves, go far to meet the objections of those who deny the possibility of spontaneous coagulation at the roots of the pulmonary arteries.

The records of post-mortem examinations show also, that

¹ See especially *Bertin des Embolies*, p. 46, *et seq.*

² *Bertin des Embolies*, p. 149.

³ *Humphrey, On the Coagulation of the Blood in the Venous System during Life.*

in many of the cases the right side of the heart, as well as the larger branches of the pulmonary arteries, contained firm, leathery, decolorised, and laminated coagula, which could not have been recently formed. The advocates of the purely embolic theory maintain that these are secondary coagula, formed around an embolus. But surely the mechanical causes which are sufficient to prevent the spontaneous deposition of fibrine, would also suffice to prevent its gathering round an embolus; unless, indeed, the obstruction was sufficient to arrest the circulation altogether, when death would occur before there was any time for secondary deposit. Before we can admit the possibility of embolism we must have at least one factor, the existence of thrombosis in a peripheral vessel, from which an embolism can come. In many of the recorded cases nothing of the kind was found, and although, as is argued, this may have been overlooked, yet such an oversight can hardly always have been made.

Results of
post-
mortem
examina-
tions.

The strongest argument, however, in favour of the spontaneous origin of pulmonary thrombosis is one which I originally pointed out in a series of papers 'On thrombosis and embolism of the pulmonary artery as a cause of death in the puerperal state.'¹ I there showed, from a careful analysis of 25 cases of sudden death after delivery in which accurate post-mortem examination had been made, that cases of spontaneous thrombosis and true embolism may be divided from each other by a clear line of demarcation, depending on the period after delivery at which the fatal result occurs. In 7 out of these 25 cases there was distinct evidence of true embolism, and in them the death occurred at a remote period after delivery; in none before the nineteenth day. This contrasts remarkably with the cases in which the post-mortem examination afforded no evidence of embolism. These amounted to 15 out of the 25, and in all of them, with one exception, death occurred before the fourteenth day, often on the second or third. The reason of this seems to be that in the former, time is required to admit of degenerative changes taking place in the deposited fibrine leading to separation of an embolus; while in the latter, the thrombosis corresponds in time, and to a great extent no doubt also in cause, to the original peripheral throm-

Clinical
facts sup-
port this
view.

¹ *Lancet*, 1867.

bosis from which, in the former, the embolus was derived. Many cases I have since collected illustrate the same rule in a very curious and instructive way.

Another clinical fact I have observed points to the same conclusion. In one or two cases distinct signs of pulmonary obstruction have shown themselves without proving immediately fatal, and shortly *afterwards*, pneripheral thrombosis, as evidenced by phlegmasia dolens of one extremity, has commenced. Here the peripheral thrombosis obviously followed the central, both being produced by identical causes, and the order of events, necessary to uphold the purely embolic theory, was reversed.

I hold, then, that those who deny the possibility of spontaneous coagulation in the heart and pulmonary arteries do so on insufficient grounds, and that we may consider it to be an occurrence, rare no doubt, but still sufficiently often met with, and certainly of sufficient importance, to merit very careful study.

History.

Dr. Meigs, of Philadelphia, was one of the first to direct attention to spontaneous coagulation of the blood in the right side of the heart and pulmonary arteries, as a cause of sudden death in the puerperal state. The occurrence itself, however, had been carefully studied by Paget, whose paper was published in 1845, four years before Meigs wrote on the subject.¹ It is true that none of Paget's cases happened after delivery, but he none the less clearly apprehended the nature of the obstruction. In 1855, Hecker² attributed the majority of these cases to embolism proper; and since that date most authors have taken the same view, believing that spontaneous coagulation only occurs in exceptional cases, such as those in which, on account of some obstruction in the lung, or in the debility of the last few hours before death, coagula form in the smaller ramifications of the pulmonary arteries, and gradually creep backwards towards the heart.

Symptoms of pulmonary obstruction.

The symptoms can hardly be mistaken, and there seems to be no essential difference between the symptomatology of spontaneous and embolic obstruction, so that the same description will suffice for both. In a large proportion of cases the attack comes on with an appalling suddenness which forms

¹ *Medico. Chir. Trans.*, vol. xxvii. p. 162, and vol. xxviii. p. 352. *Philadelphia Medical Examiner*, 1849.

² *Deutsche Klinische*, 1855.

one of its most striking characteristics. Nothing in the condition of the patient need have given rise to the least suspicion of impending mischief, when, all at once, an intense and horrible dyspnea comes on; the patient gasps and struggles for breath; tears off the coverings from her chest in a vain endeavour to get more air; and, too often, dies in a few minutes, long before medical aid can be had, with all the symptoms of asphyxia. The muscles of the face and thorax are violently agitated in the attempt to oxygenate the blood, and an appearance closely resembling an epileptic convulsion may be presented. The face may be either pale or deeply cyanosed. Thus in one case I have elsewhere recorded, which was an undoubted example of true embolism, Mr. Pedler, the resident accoucheur at King's College Hospital, who was present during the attack, writes of the patient,¹ 'She was suffering from extreme dyspnea, the countenance was excessively pale, her lips white, the face generally expressing deep anxiety.' In another, which was probably an example of spontaneous thrombosis,² occurring on the 12th day after delivery, it is stated 'the face had assumed a livid purple hue, which was so remarkable as to attract the attentions both of the nurse and of her mother, who was with her.' The extreme embarrassment of the circulation is shown by the tumultuous and irregular action of the heart, in its endeavour to send the venous blood through the obstructed arteries. Soon it gets exhausted, as shown by its feeble and fluttering beat. The pulse is thread-like, and nearly imperceptible, the respirations short and hurried, but air may be heard entering the lungs freely. The intelligence during the struggle is unimpaired; and the dreadful consciousness of impending death adds not a little to the patient's sufferings, and to the terror of the scene. Such is an imperfect account of the symptoms, gathered from a record of what has been observed in fatal cases. It will be readily understood why, in the presence of so sudden and awful an attack, symptoms have not been recorded with the accuracy of ordinary clinical observation.

A question of great practical interest, and one which has been entirely overlooked by writers on the subject is—Have

Is recovery possible?

¹ *Brit. Med. Journ.* March 27, 1860.

² *Obst. Trans.* vol. xii. p. 194.

we any ground for supposing that there is a possibility of recovery after symptoms of pulmonary obstruction have developed themselves? That such a result must be of extreme rarity is beyond question; but I have little doubt that in some few cases, entirely inexplicable on any other hypothesis, life is prolonged until the coagulum is absorbed, and the pulmonary circulation restored. In order to admit of this it is, of course, essential that the obstruction be not sufficient to prevent the passage of a certain quantity of blood to the lungs, to carry on the vital functions. The history of many cases tends to show that the obstructing clot was present for a considerable time before death, and that it was only when some sudden exertion was made, such as rising from bed or the like, calling for an increased supply of blood which could not pass through the occluded arteries, that fatal symptoms manifested themselves. This was long ago pointed out by Paget,¹ who says 'The case proves that, in certain circumstances, a great part of the pulmonary circulation may be arrested in the course of a week (or a few days more or less), without immediate danger to life, or any indication of what had happened.' And, after referring to some illustrative cases, 'Yet in all these cases the characters of the clots by which the pulmonary arteries were obstructed, showed plainly that they had been a week or more in the process of formation.' If we admit the possibility of the continuance of life for a certain time, we must, I think, also admit the possibility, in a few rare cases, of eventual complete recovery. What is required is time for the absorption of the clot. In the peripheral venous system coagula are constantly removed by absorption. So strong, indeed, is the tendency to this, that Humphrey observes with regard to it, 'It appears that the blood is almost sure to revert to its natural channel in process of time.'² If then the obstruction be only partial, if sufficient blood pass to keep the patient alive, and a sudden supply of oxygenated blood is not demanded by any exertion which the embarrassed circulation is unable to meet, it is not inconceivable that the patient may live until the obstruction is removed.

Such, I believe, to be the only explanation of certain

¹ *Op. cit.* p. 358.

² *Med. Chir. Trans.* vol. xxvii. p. 14.

cases, some of which, on any other hypothesis, it is impossible to understand. The symptoms are precisely those of pulmonary obstruction, and the description I have given above may be applied to them in every particular; and, after repeated paroxysms, each of which seems to threaten immediate dissolution, an eventual recovery takes place. What then, I am entitled to ask, can the condition be, if not that which I suggest? As the question I am considering has never, so far as I am aware, been treated of by any other writer, I may be permitted, very briefly, to state the facts of one or two of the cases on which I found my argument, some of which I have already published in detail elsewhere.

Illustrative cases.

K. H., delicate young lady. Labour easy. First child. Profuse post-partum hæmorrhage. Did well until the 7th day, during the whole of which she felt weak. Same day an alarming attack of dyspnea came on. For several days she remained in a very critical condition, the slightest exertion bringing on the attacks. A slight blowing murmur heard for a few days at the base of the heart, and then disappeared. For two months patient remained in the same state. As long as she was in the recumbent position she felt pretty comfortable; but any attempt at sitting up in bed, or any unusual exertion, immediately brought on the embarrassed respiration. During all this time it was found necessary to administer stimulants profusely to ward off the attacks. Eventually the patient recovered completely.

Q. F., æt. 44. Mother of twelve children. Confined on July 6. On the 11th day she went to bed feeling well. There was no swelling or discomfort of any kind about the lower extremities at this time. About half-past 3 A.M. she was sitting up in bed, when she was suddenly attacked with an indescribable sense of oppression in the chest, and fell back in a semi-unconscious state, gasping for breath. She remained in a very critical condition, with the same symptoms of embarrassed respiration, for three days, when they gradually passed away. Two days *after* the attack, phlegmasia dolens came on, the left leg swelled, and remained so for several months.

This case is an example of the fact I have already referred to, of phlegmasia dolens coming on *after* the symptoms of pulmonary obstruction had manifested themselves; the inference being that both depended on similar causes operating on two distinct parts of the circulatory system.

C. H., æt. 24. Confined of her first child on August 20, 1867. Thirty hours after delivery she complained of great weakness and dyspnea. This was alleviated by the treatment employed, but on the ninth day, after making a sudden exertion, the dyspnea returned with increased violence, and continued unabated until I saw the patient on September 4, fourteen

days after her confinement. The following are the notes of her condition made at the time of the visit: 'I found her sitting on the sofa, propped up with pillows, as she said she could not breath in the recumbent position. The least excitement or talking brought on the most aggravated dyspnea, which was so bad as to threaten almost instant death. Her sufferings during these paroxysms were terrible to witness. She panted and struggled for breath, and her chest heaved with short gasping respirations. She could not even bear any one to stand in front of her, waving them away with her hand, and calling for more air. These attacks were very frequent, and were brought on by the most trivial causes. She talked in a low suppressed voice, as if she could not spare breath for articulation. On auscultation air was found to enter the lungs freely in every direction, both in front and behind. Immediately over the site of the pulmonary arteries there was a distinct harsh, rasping murmur, confined to a very limited space, and not propagated either upwards or downwards. The heart sounds were feeble and tumultuous.' These symptoms led me to diagnose pulmonary obstruction, and I, of course, gave a most unfavourable prognosis, but to my great surprise the patient slowly recovered. I saw her again six weeks later, when her heart sounds were regular and distinct, and the murmur had completely disappeared.

E. E., æt 42, was confined for the first time on November 5, 1873, in the sixth month of utero-gestation. She had severe post-partum hæmorrhage, depending on partially adherent placenta, which was removed artificially. She did perfectly well until the 14th day after delivery, when she was suddenly attacked with intense dyspnea, aggravated in paroxysms. Pulse pretty full, 130, but distinctly intermittent. Air entered lungs freely. The heart's action was fluttering and irregular, and, at the juncture of the fourth and fifth ribs with the sternum, there was a loud blowing systolic murmur. This was certainly non-existent before, as the heart had been carefully auscultated before administering chloroform during labour. For two days the patient remained in the same state, her death being almost momentarily expected. On the 21st, that is two days after the appearance of the chest symptoms, phlegmasia dolens of a severe kind developed itself in the right thigh and leg. She continued in the same state for many days, lying more or less tranquilly, but having paroxysms of the most intense apnea, varying from two to six or eight in the twenty-four hours. No one who saw her in one of these could have expected her to live through it. Shortly after the first appearance of the paroxysms it was observed that the cellular tissue of the neck and part of the face became swollen and oedematous, giving an appearance not unlike that of phlegmasia dolens. The attacks were always relieved by stimulants. These she incessantly called for, declaring that she felt they kept her alive. During all this time the mind was clear and collected. The pulse varied from 110 to 130. Respirations about 60. T. 101 to 102.5. By slow degrees the patient seemed to be rallying. The paroxysms diminished in number, and after December 1 she never had another, and the breathing became free and easy. The pulse fell to 80, and the cardiac murmur entirely disappeared.

The patient remained, however, very weak and feeble, and the debility seemed to increase. Towards the second week in December she became delirious, and died, apparently exhausted, without any fresh chest symptoms, on the 19th of that month. No post-mortem examination was allowed.

I have narrated this case, although it terminated fatally, because I hold it to be one of the class I am considering. The death was certainly not due to the obstruction, all symptoms of which had disappeared, but apparently to exhaustion from the severity of the former illness. It illustrates too the simultaneous appearance of symptoms of pulmonary obstruction and peripheral thrombosis. The swelling of the neck was a curious symptom, which has not been recorded in any other cases, and may possibly be a further proof of the analogy between this condition and phlegmasia dolens.

Now, it may, of course, be argued that these cases do not prove my thesis, inasmuch as I only assume the presence of a coagulum. But I may fairly ask in return what other condition could possibly explain the symptoms? They are precisely those which are noticed in death from undoubted pulmonary obstruction. No one seeing one of them, or even reading an account of the symptoms, while ignorant of the result, could hesitate a single instant in the diagnosis. Surely, then, the inference is fair that they depended on the same cause? In the very nature of things my hypothesis cannot be verified by post-mortem examination; but there is at least one case on record, in which, after similar symptoms, a clot was actually found. The case is related by Dr. Richardson.¹ It was that of a man who for weeks had symptoms precisely similar to those observed in the cases I have narrated. In one of his agonising struggles for breath he died, and after death it was found 'that a fibrinous band, having its hold in the ventricle, extended into the pulmonary artery.' This observation proves to a certainty that life may continue for weeks after the deposition of a coagulum; and, moreover, this condition was precisely what we should anticipate, since, of course, the obstructing coagulum must necessarily be small; otherwise the vital functions would be immediately arrested.

Such cases
can only
depend on
pulmonary
obstruction.

¹ *Clinical Essays*, p. 224, *et seq.*

Cardiac
murmurs
in pul-
monary ob-
struction.

There is a symptom noted in two of the above cases, and to less extent in a third, which has not been mentioned in any account of fatal cases occurring after delivery, viz. the presence of a distinct murmur over the site of the pulmonary arteries. It is a sign we should naturally expect, and it proves that the cause of the disease was at least cardiac. Very possibly it would be met with in fatal cases if attention were particularly directed to it. In both these instances it was exceedingly well marked, and in both it entirely disappeared when the symptoms abated. The probability of such a murmur being audible in cases of thrombosis of the pulmonary artery, has been recognised by one of our highest authorities in cardiac disease, who actually observed it in a non-puerperal case. In the last edition of his work on diseases of the heart, Dr. Walshe¹ says: 'The only physical condition connected with the vessel itself would probably be systolic basic murmur following the course of the pulmonary main trunk and of its immediate divisions to the left and right of the sternum. This sign I most certainly heard in an old gentleman whose life was brought to a sudden close, in the course of an acute affection, by coagulation in the pulmonary artery, and to a moderate extent in the right ventricle.'

Similar
cases have,
probably,
been misin-
terpreted.

Similar cases have probably been overlooked or misinterpreted. Many seem to have been attributed to shock, in the absence of a better explanation, a condition to which they bear no kind of resemblance.

Causes of
death.

The precise mode of death in pulmonary obstruction, whether dependent on thrombosis or embolism, has given rise to considerable difference of opinion. Virchow attributes it to syncope,² depending on stoppage of the cardiac contraction. Panum,³ on the other hand, contests this view, maintaining that the heart continues to beat even after all signs of life have ceased. Certainly tumultuous and irregular pulsations of the heart are a prominent symptom in most of the recorded cases, and are not reconcilable with the idea of syncope. Panum's own theory is, that death is the result of cerebral anæmia. Paget seems to think that the mode of death is altogether peculiar, in some respects resembling syncope, in

¹ Walshe *On Diseases of the Heart*, 4th ed. 1873.

² *Gesamm. Abhandl.* 1862, p. 316.

³ Virchow, *Archiv*, 1863.

others anæmia. Bertin, who has discussed the subject at great length, attributes the fatal result purely to asphyxia. The condition, indeed, is in all respects similar to that state; the oxygenation of the blood being prevented, not because air cannot get to the blood, but because blood cannot get to the air. The symptoms also seem best explained by this theory; the intense dyspnea, the terrible struggle for air, the preservation of intelligence, the tumultuous action of the heart, are certainly not characteristic either of syncope or anæmia.

The anatomical character of the clots seems to vary considerably. Ball, by whom they have been most carefully described, believes that they generally commence in the smaller ramifications of the arterics, extending backwards towards the heart, and filling the vessels more or less completely. Towards its cardiac extremity the coagulum terminates in a rounded head, in which respect it resembles coagula spontaneously formed in the peripheral veins. They are non-adherent to the coats of the vessels, and the blood circulates, when it can do so at all, between them and the vascular walls. Such clots are white, dense, and of an homogeneous structure, consisting of layers of decolorised fibrine, firm at the periphery, where the fibrine has been most recently deposited, and softened in the centre, where amylaceous or fatty degeneration has commenced. Ball maintains that if the coagulum have commenced in the larger branches of the arteries, it must have first begun in the heart, and extended into them from the ventricle. According to Humphrey, the same changes take place in pulmonary as in peripheral thrombi, and they may become adherent to the walls of the vessels, or converted into threads or bands. When the obstruction is due to embolism, provided the case is a well-marked one, and the embolus of some size, the appearances presented are different. We have no longer a laminated and decolorised coagulum, with a rounded head, similar to a peripheral thrombus. The obstruction in this case generally takes place at the point of bifurcation of the artery, and we there meet with a greyish white mass, contrasting remarkably with the more recently deposited fibrine before and behind it. It may be that the form of the embolus shows that it has recently been separated from a clot elsewhere; and in many cases it has been possible to fit

Post-mortem
appearances
of clots.

the travelled portion to the extremity of the clot from which it has been broken. We may also, perhaps, find that the embolus has undergone an amount of retrograde metamorphosis corresponding with that of the peripheral thrombus from which we suppose it to have come, but differing from that of the more recently-deposited fibrine around it. It must be admitted, however, that the anatomical peculiarities of the coagula will by no means always enable us to trace them to their true origin. In many cases emboli may escape detection from their smallness, or from the quantity of fibrine surrounding them.

Treatment

But few words need be said as to the treatment of pulmonary obstruction. In a large majority of cases the fatal result so rapidly follows the appearance of the symptoms, that no time is given us even to make an attempt to alleviate the patient's sufferings. Should we meet with a case not immediately fatal, it seems that there are but two indications of treatment affording the slightest rational ground of hope.

1. To keep the patient alive by the administration of stimulants—brandy, ether, ammonia, and the like, to be repeated at intervals corresponding to the intensity of the paroxysms, and the results produced. In the cases I have above narrated, in which recovery ensued, this took the place of all other medication. Possibly leeches, or dry cupping to the chest, might prove of some service in relieving the circulation.

2. To enjoin the most absolute and complete repose. The object of this is evident. The only chance for the patient seems to be, that the vital functions should be carried on until the coagulum has been absorbed, or, at least, until it has been so much lessened in size as to admit of blood passing it to the lungs. The slightest movements may give rise to a fatal paroxysm of dyspnea, from the increased supply of oxygenated blood required. It must not be forgotten that in a large proportion of cases death immediately followed some exertion in itself trivial, such as rising out of bed. Too much attention, then, cannot be given to this point. The patient should be absolutely still; she should be fed with abundance of fluid food, such as milk, strong soups, and the like; and should on no account be permitted

to raise herself in bed, or attempt the slightest muscular exertion. If we are fortunate enough to meet with a case apparently tending to recovery, these precautions must be carried on long after the severity of the symptoms have lessened, for a moment's imprudence may suffice to bring them back in all their original intensity.

Bertin,¹ indeed, recommends a system of treatment very different from this. In the vain hope that the violent effort induced may cause the displacement of the impacted embolus (to which alone he attributes pulmonary obstruction), he recommends the administration of emetics. Few, I fancy, will be found bold enough to attempt so hazardous a plan of treatment.

Various drugs have been suggested in these cases. Richardson recommended ammonia, a deficiency of which he at that time believed to be the chief cause of coagulation. He has since advised that liquor ammoniæ should be given in large doses, 20 minims every hour, in the hope of causing solution of the deposited fibrine; and he has stated that he has seen good results from the practice. Others advised the administration of alkalis, in the hope that they may favour absorption. The best that can be said for them is, that they are not likely to do much harm.

¹ *Op. cit.* p. 393.

CHAPTER VII.

PUERPERAL ARTERIAL THROMBOSIS AND EMBOLISM.

Arterial
thrombosis
and embo-
lism.

THE same condition of the blood which so strongly predisposes to coagulation in the vessels through which venous blood circulates, tends to analogous results in the arterial system. These, however, are by no means so common, and do not, as a rule, lead to such important consequences. The subject has been but little studied, and almost all our knowledge of it is derived from a very interesting essay by Sir James Simpson.¹ As I have devoted so much space to the consideration of venous thrombosis and embolism, I shall but briefly consider the effects of arterial obstruction.

Causes.

In a considerable number of the recorded cases the obstruction has resulted from the detachment of vegetations deposited on the cardiac valves, the result of endocarditis, either produced by antecedent rheumatism, or as a complication of the puerperal state. Sometimes the obstruction seems to depend on some general blood dyscrasia, similar to that producing venous thrombosis, or on some local change in the artery itself. Thus Simpson records a case apparently produced by local arteritis, which caused acute gangrene of both lower extremities, ending fatally in the third week after delivery. In other cases it has been attributed to coagulation following spontaneous laceration and corrugation of the internal coat of the artery.

Symptoms.

The symptoms of puerperal arterial obstruction must, of course, vary with the particular arteries affected. Those, with the obstruction of which we are most familiar, are the cerebral, the humeral, and the femoral. The effects produced must also be modified by the size of the embolus, and the more or less complete obstruction it produces. Thus, for example, if the middle cerebral artery be blocked up entirely, the functions of those portions of the brain supplied by it will be

¹ *Selected Obst. Works*, vol. i. p. 523.

more or less completely arrested, and hemiplegia of the opposite side of the body, followed by softening of the brain texture, will probably result. If the nervous symptoms be developed gradually, or increase in intensity after their first appearance, it may be that an obstruction, at first incomplete, has increased by the deposition of fibrine around it. So the occasional sudden supervention of blindness, with destruction of the eyeball—cases of which are recorded by Simpson—not improbably depend on occlusion of the ophthalmic artery, the function of the organ depending on its supply through the single artery. The effects of obstruction of the visceral arteries in the puerperal state are entirely unknown; but it is far from unlikely that farther investigation may prove them to be of great importance. In the extremities arterial obstruction produces effects which are well marked. They are classified by Simpson under the following heads: 1. *Arrest of pulse below the site of obstruction.*—This has been observed to come on either suddenly or gradually, and if the occlusion be in one of the large arterial trunks, it is a symptom which a careful examination will readily enable us to detect. 2. *Increased force of pulsation in the arteries above the seat of obstruction.* 3. *Fall in the temperature of the limb.*—This is a symptom which is also easily appreciable by the thermometer, and, when the main artery of the limb is occluded, the coldness of the extremity is well marked. 4. *Lesions of motor and sensory functions, paralysis, neuralgia, &c., &c.*—Loss of power in the affected limb is often a prominent symptom, and when it comes on suddenly, and is complete, the main artery will probably be occluded. It may be diagnosed from paralysis depending on cerebral or spinal causes by the absence of head symptoms, by the history of the attack, and by the presence of other indications of arterial obstruction, such as loss of pulsation in the artery, fall of temperature, &c. The sensory functions in these cases are generally also seriously disturbed, not so much by loss of sensation, as by severe pain and neuralgia. Sometimes the pain has been excessive, and occasionally it has been the first symptom which directed attention to the state of the limb. 5. *Gangrene below or beyond the seat of arterial obstruction.*—Several interesting cases are recorded, in which gangrene has followed arterial obstruction. Generally speaking

gangrene will not follow occlusion of the main arterial trunk of an extremity, as the collateral circulation becomes soon sufficiently developed to maintain its vitality. In many of the cases either thrombi has obstructed the channels of collateral circulation as well, or the veins of the limb have also been blocked up. When such extensive obstructions occur they obviously cannot be embolic, but must depend on a local thrombosis, traceable to some general blood dyscrasia depending on the puerperal state.

Treat-
ment.

Little can be said as to the treatment of such cases, which must vary with the gravity and nature of the symptoms in each. Beyond absolute rest (in the hope of eventual absorption of the thrombus or embolus), generous diet, attention to the general health of the patient, and sedative applications to relieve the local pain, there is little in our power. Should gangrene of an extremity supervene in a puerperal patient, the case must necessarily be well nigh hopeless. Simpson, however, records one instance in which amputation was performed above the line of demarcation, the patient eventually recovering.

CHAPTER VIII.

OTHER CAUSES OF SUDDEN DEATH DURING LABOUR AND THE
PUERPERAL STATE.

A LARGE number of the cases in which sudden death occurs during or after delivery find their explanation, as I have already pointed out, in thrombosis or embolism of the heart and pulmonary arteries. Probably, many cases of the so-called *idiopathic asphyxia* were in fact examples of this accident, the true nature of which had been misunderstood. Besides these there are, no doubt, many other conditions which may lead to a suddenly fatal result in connection with parturition.

Various
causes of
sudden
death.

Some of these are of an organic, others of a functional nature.

Among the former may be mentioned cases in which the straining efforts of the second stage of labour have produced death in patients suffering from some pre-existent disease of the heart. Rupture of that organ has probably occurred from fatty degeneration of its walls. Dehous¹ narrates an instance in which the efforts of labour caused the rupture of an aneurism. Another case, from interference with the action of the heart in a patient who had pericardial effusion, is narrated by Ramsbotham. Dr. Devilliers relates an instance occurring in a young woman during the second stage of labour. The heart was found to be healthy, but the lungs were intensely congested, and blood was extensively extravasated all through their texture. This was probably caused by pulmonary congestion and apoplexy, produced by the severe straining efforts. Many cases from effusion of blood in the brain substance, or on its surface, are on record, no doubt in patients who, from arterial degeneration or other causes, were predisposed to apoplectic effusions. The so-called apoplectic convulsions, formerly described in most works on

Organic
causes.

¹ Dehous, *Sur les Morts subites*.

obstetrics as a variety of puerperal convulsions, are evidently nothing more than apoplexy coming on during or after labour. As regards their pathology they do not seem to differ from ordinary cases of apoplexy in the non-pregnant condition. One example is recorded of death which was attributed to rupture of the diaphragm from excessive action in the second stage.

Functional
causes.

Among the causes of death which cannot be traced to some distinct organic lesion, may be classed cases of syncope, shock, and exhaustion. Many instances of this kind are recorded. Thus in some women of susceptible nervous organisation, the severity of the suffering appears to bring on a condition similar to that produced by excessive shock or exhaustion, which has not unfrequently proved fatal. Several examples of this kind have been cited by McClintock.¹ It is also not unlikely that sudden syncope sometimes produces a fatal result, during or after labour. Most cases of death, otherwise inexplicable, used to be referred to this cause; but accurate autopsies were seldom made, and even when they were—the important effects of pulmonary coagula being unknown—it is more than probable that the true cause of death was overlooked. It has been supposed that the sudden removal of pressure from the veins of the abdomen, by the emptying of the gravid uterus after delivery, may favour an increased afflux of blood into the lower parts of the body, and thus tend to an anæmic condition of the brain, and the production of syncope. However this may be, the possibility of its occurrence, and its manifest danger in a recently delivered woman, are sufficient reasons for enforcing the recumbent position after labour is over. In some of the cases the syncope was evidently produced by the patient's suddenly sitting upright.

Death
from air in
the veins.

Some cases of sudden death immediately after labour seem to be due to the entrance of air into the veins. Six examples are cited by McClintock which were probably due to this cause. La Chapelle relates two. An interesting case is related by M. Lionet.² In this the patient died five and a half hours after an easy and natural labour, the chief symptoms being extreme pallor, efforts at vomiting, and dyspnea.

¹ *Union Medic.* 1853.

² Dehous, *Op. cit.* p. 58.

Air was found in the heart and in the arachnoid veins. There can be no question that the uterine sinuses after delivery are nearly as well adapted as the veins of the neck for facilitating the entrance of air. They are firmly attached to the muscular walls of the uterus, so that they gape open when that organ is relaxed, and it is easy to understand how air might enter. Indeed, in the post-mortem examination in one of the cases occurring in the practice of Mme. La Chapelle, it is stated that 'the uterine sinuses opened in the interior of the uterus by large orifices (one line and a half in diameter), through which air could readily be blown as far as the iliac veins, and *vice versa*.' The condition of the uterus after delivery also enables the air to have ready access to the mouths of the sinuses, for the alternate relaxation and contraction of the uterus, occurring after the placenta is expelled, would tend to draw in the air as by a suction pump. Hence, an additional reason for insisting on firm contraction of the uterus, as this will lessen the risk of this accident.

The precise mechanism of death from air in the veins has been a subject of dispute among pathologists. By Richat,¹ it was referred to anæmia and syncope from want of blood in the vessels of the brain, which were occupied by air; Nysten² attributed it to distension of the cavities of the heart by rarefied air, producing paralysis of its walls; Geroy to a stoppage of the pulmonary circulation, and consequent want of proper blood supply to the left heart; while Leroy d'Etoilles thought it might depend on any of these causes, or a combination of all of them. These, and many other hypotheses on the subject, have been advanced, to all of which serious objection could be raised. The most recent theory is one maintained by Virchow and Oppolzer,³ and more recently by Feltz, which attributes the fatal results to impaction of the air globules in the lesser divisions of the pulmonary arteries, where they form gaseous emboli, and cause death exactly in the same way as when the obstruction depends on a fibrinous embolism. The symptoms observed in fatal cases closely correspond to those of pulmonary obstruction, and it is not unlikely that some cases,

Cause of death in such cases.

¹ *Recherches sur le Vie et la Mort*, 1853.

² Nysten, *Recherches de Phys. et Chém. Path.* 1811.

³ *Casustics des Embolie; Wiener Med. Woch.*, 1863. *Des Embolies Capillaires*, 1863. *Op. cit.* p. 115.

attributed to other causes, may really depend on the entrance of air through the uterine sinuses. Such, for example, was most probably the explanation of a case referred to by Dr. Graily Hewitt in a discussion at the Obstetrical Society.¹ Death occurred shortly after the removal of an adherent placenta, during which, no doubt, air could readily enter the uterine cavity. The symptoms, viz. 'severe pain in the cardiac region, distress as regards respiration, and pulselessness,' are identical with those of pulmonary obstruction. Dr. Hewitt refers the death to shock, which certainly does not generally produce such phenomena.

¹ *Obstet. Trans.* vol. x. p. 28.

CHAPTER IX.

PERIPHERAL VENOUS THROMBOSIS—(SYN.: CRURAL PHLEBITIS—
PHLEGMASIA DOLENS—ANASARCA SEROSA—ŒDEMA LACTEUM
—WHITE LEG, ETC.)

WE now come to discuss the symptoms and pathology of the conditions associated with the formation of thrombi in the peripheral venous system, or rather in the veins of the lower extremities, since too little is known of their occurrence in other parts to enable us to say anything on the subject.

Periphe-
ral throm-
bosis.

The most important of these is the well-known disease which, under the name of *phlegmasia dolens*, has attracted much attention, and given rise to numerous theories as to its nature and pathology. In describing it as a local manifestation of a general blood dyscrasia, and not as an essential local disease, I am making an assumption as to its pathology, that many eminent authorities would not consider justifiable. I have, however, already stated some of the reasons for so doing, and I shall shortly hope to show that this view is not incompatible with the most probable explanation of the peculiar state of the affected limb.

The first symptom that usually attracts attention is severe pain in some part of the limb that is about to be affected. The character of the pain varies in different cases. In some it is extremely acute, and is most felt in the neighbourhood of, and along the course of the chief venous trunks. It may begin in the groin or hip, and extend downwards; or it may commence in the calf, and proceed upwards towards the pelvis. The pain abates somewhat after swelling of the limb (which generally begins within twenty-four hours), but it is always a distressing symptom, and continues as long as the acute stage of the disease lasts. The restlessness, want of sleep, and suffering which it produces are sometimes excessive. Coincident with the pain, and sometimes preceding it, more or less malaise is experienced. The patient may for

Symp-
toms.

a day or two be restless, irritable, and out of sorts, without any very definite cause; or the disease may be ushered in by a distinct rigor. Generally there is constitutional disturbance, varying with the intensity of the case. The pulse is rapid and weak; 120 or thereabouts; the temperature elevated, from 101° to 102° , with an evening exacerbation. The patient is thirsty; the tongue glazed, or white and loaded; the bowels constipated. In some few cases, when the local affection is slight, none of these constitutional symptoms are observed.

Condition
of the af-
fected
limb.

The characteristic swelling rapidly follows the commencement of the symptoms. It generally begins in the groin, from whence it extends downwards. It may be limited to the thigh, or the whole limb, even to the feet, may be implicated. More rarely it commences in the calf of the leg, extending upwards to the thigh, and downwards to the feet. The affected parts have a peculiar appearance, which is pathognomonic of the disease. They are hard, tense, and brawny; of a shiny, white colour; and not yielding on pressure, except towards the beginning and end of the illness. The appearances presented are quite different from those of ordinary cedema. When the whole thigh is affected the limb is enormously increased in size. Frequently the venous trunks, especially the femoral and popliteal veins, are felt obstructed with coagula, and rolling under the finger. They are painful when handled, and in their course more or less redness is occasionally observed. Either leg may be attacked, but the left more frequently than the right. There is a marked tendency for the disease to spread to the sound limb, and we often find, in a case which is progressing apparently well, a rise of temperature and an accession of febrile symptoms, followed by the swelling of the other limb.

Progress of
the disease.

After the acute stage has lasted from a week to a fortnight, the constitutional disturbance becomes less marked, the pulse and temperature fall, the pain abates, and the sleeplessness and restlessness are less. The swelling and tension of the limb now begin to diminish, and absorption commences. This is invariably a slow process. It is always many weeks before the effusion has disappeared, and it may be many months. The limb retains for a length of time the peculiar *wooden* feeling, as Dr. Churchill terms it. Any im-

prudence, such as a too early attempt at walking, may bring on a relapse and fresh swelling of the limb. This gradual recovery is by far the most common termination of the disease. In some rare cases suppuration may take place, either in the sub-cutaneous cellular tissue, the lymphatic glands, or even in the joints, and death may result from exhaustion. The possibility of pulmonary obstruction and sudden death from separation of an embolus have already been pointed out; and the fact that this lamentable occurrence has generally followed some undue exertion should be borne in mind, as a guide in the management of our patient.

The disease usually begins within a short time after delivery, rarely after the second week. In 22 cases tabulated by Dr. Robert Lee, 7 were attacked between the fourth and twelfth days, and 14 after the second week. Some cases have been described as commencing even months after delivery. It is questionable if these can be classed as puerperal, for it must not be forgotten that phlegmasia dolens is by no means necessarily a puerperal disease. There are many other conditions which may give rise to it, all of them, however, such as produce a septic and hyperinosed state of the blood, such as malignant disease, dysentery, phthisis, and the like. My own experience would lead me to think that cases of this kind are much more common than is generally believed.

The disease has long attracted the attention of the profession. Passing over more or less obscure notices by Hippocrates, De Castro, and others, we find the first clear account in the writings of Mauriceau, who not only gave a very accurate description of its symptoms, but made a guess at its pathology, which was certainly more happy than the speculations of his successors; it is, he says, caused, 'by a reflux on the parts of certain humours which ought to have been evacuated by the lochia.' Puzos ascribed it to the arrest of the secretion of milk, and its extravasation in the affected limb. This theory, adopted by Levret and many subsequent writers, took a strong hold on both professional and public opinion, and to it we owe many of the names by which the disease is known to this day, such as *œdema lacteum*, milk leg, &c. In 1784 Mr. White, of Manchester, attributed it to some morbid condition of the lymphatic glands and vessels of the affected parts; and this, or some analogous theory, such as that of

Period of
commence-
ment

History
and
pathology.

Theory of
Puzos

rupture of the lymphatics crossing the pelvic brim, as maintained by Trye, of Gloucester, or general inflammation of the absorbents as held by Dr. Ferriar, was generally adopted.

Phlebitic
theory.

.It was not until the year 1823 that attention was drawn to the condition of the veins. To Bouillaud belongs the undoubted merit of first pointing out that the veins of the affected limb were blocked up by coagula, although the fact had been previously observed by Dr. Davis, of University College. Dr. Davis made dissections of the veins in a fatal case, and found, as Bouillaud had done, that they were filled with coagula, which he assumed to be the results of inflammation of their coats; hence the name of '*crural phlebitis*,' which has been extensively adopted instead of phlegmasia dolens. Dr. Robert Lee did much to favour this view, and finding that thrombi were present in the iliac and uterine, as well as in the femoral, veins, he concluded that the phlebitis commenced in the uterine branches of the hypogastric veins, and extended downwards to the femorals. He pointed out that phlegmasia dolens was not limited to the puerperal state; but that when it did occur independently of it, other causes of uterine phlebitis were present, such as cancer of the os and cervix uteri. The inflammatory theory was pretty generally received, and even now is considered by many to be a sufficient explanation of the disease. Indeed the fact that more or less thrombus was always present could not be denied, and on the supposition that thrombus could only be caused by phlebitis, as was long supposed to be the case, the inflammatory theory was the natural one! Before long, however, pathologists pointed out that thrombosis was by no means necessarily, or even generally, the result of inflammation of the vessels in which the clot was contained, but that the inflammation was more generally the result of the coagulum.

Theory of
its depend-
ence on
septic
causes.

The late Dr. Mackenzie took a prominent part in opposing the phlebitic theory. He proved, by numerous experiments in the lower animals, that inflammation is not sufficient of itself to produce the extensive thrombi which are found to exist, and that inflammation originating in one part of a vein is not apt to spread along its canal, as the phlebitic theory assumes. His conclusion is, that the origin of the disease is rather to be sought in some septic or altered condi-

tion of the blood, producing coagulation in the veins. Dr. Tyler Smith¹ pointed out an occasional analogy between the causes of phlegmasia dolens and puerperal fever, evidently recognising the dependence of the former on blood dyscrasia. 'I believe,' he says, 'that contagion and infection play a very important part in the production of the disease. I look on a woman attacked with phlegmasia dolens as having made a fortunate escape from the greater dangers of diffuse phlebitis or puerperal fever.' In illustration of this he narrates the following instructive history. 'A short time ago a friend of mine had been in close attendance on a patient dying of erysipelatous sore throat with sloughing, and was himself affected with sore throat. Under these circumstances, he attended, within the space of twenty-four hours, three ladies in their confinements, all of whom were attacked with phlegmasia dolens.'

The latest important contribution to the pathology of the disease is contained in two papers by Dr. Tilbury Fox, published in the second volume of the 'Obstetrical Transactions.' He maintains that something beyond the mere presence of coagula in the veins is required to produce the phenomena of the disease, although he admits that to be an important, and even an essential, part of pathological changes present. The thrombi he believes to be produced either by extrinsic or intrinsic causes: the former comprising all cases of pressure by tumour or the like; the latter, and the most important, being divisible into the heads of—

View of
Tilbury
Fox.

1. True inflammatory changes in the vessels, as seen in the epidemic form of the disease.

2. Simple thrombus, produced by rapid absorption of morbid fluid.

3. Virus action and thrombus conjoined, the phlegmasia dolens itself being the result of simple thrombus, and not produced by diseased (inflamed) coats of vessels; the general symptoms the result of the general blood state; the virus present.

He further points out that the peculiar swelling of the limbs cannot be explained by the mere presence of œdema, from which it is essentially different. The white appearance of the skin, the severe neuralgic pain, and the

¹ Tyler Smith, *Manual of Obstetrics*, p. 538.

persistent numbness, indicating that the whole of the cutaneous textures, the cutis vera, and even the epithelial layer, are infiltrated with fibrinous deposit. He concludes, therefore, that the swelling is the result of œdema *plus* something else; that something being obstruction of the lymphatics, by which the absorption of effused serum is prevented. The efficient cause which produces these changes he believes to be, in the majority of cases, a septic action originating in the uterus, producing a condition similar to that in which phlegmasia dolens arises in the non-puerperal state.

There is no doubt much force in Dr. Fox's arguments, and it may, I think, be conceded that obstruction of the veins *per se* is not sufficient to produce the peculiar appearance of the limb. It is, moreover, certain that phlebitis alone is also an insufficient explanation not only of the symptoms, but even of the presence of thrombi so extensive as those that are found. The view which traces the disease solely to inflammation or obstruction of lymphatics is purely theoretical, has no basis of facts to support it, and finds, now-a-days, no supporters. The experiments of Mackenzie and Lee, as well as the vastly increased knowledge of the causes of thrombosis which the researches of modern pathologists have given us, seem to point strongly to the view already stated, that the disease can only be explained by a general blood dyscrasia, depending on the puerperal state. It by no means follows that we are to discard Dr. Fox's speculations as incorrect. It is far from improbable that the lymphatic vessels are implicated in the production of the peculiar swelling, only we are not as yet in a position to prove it. There is no inherent improbability in the supposition that the same morbid state of the blood which produces thrombosis in the veins, may also give rise to such an amount of irritation in the lymphatics as may interfere with their functions, and even obstruct them altogether. The essential and all important point in the pathology of the disease, however, seems undoubtedly to be thrombosis in the veins; and the probability of there being some as yet undetermined pathological changes in addition to this, by no means militates against the view I have taken of the intimate connection of the disease with other results of thrombosis in more distant vessels.

The changes which take place in the thrombi all tend to their ultimate absorption. These have been described by various authors as leading to organisation or suppuration. It is probable, however, that the appearances which have led to such a supposition are fallacious, and that they are really due to retrograde metamorphosis of the fibrine, generally of an amylaceous or fatty character.

Changes occurring in the thrombi.

The peculiarities of a clot that most favour detachment of an embolus are such a shape as admits of a portion floating freely in the blood current, by the force of which it is detached and carried to its ultimate destination. When the accident has occurred, it is often possible to recognise the peripheral thrombus from which the embolus has separated, by the fact of its terminal extremity presenting a freshly fractured end, instead of the rounded head natural to it. Such detachment is unlikely to occur, even when favoured by the shape of the clot, unless sufficient time have elapsed after its formation to admit of its softening and becoming brittle. The curious fact I have before mentioned, of true puerperal embolism occurring, in the large majority of cases, only after the nineteenth day from delivery, finds a ready explanation in this theory, which it remarkably corroborates.

Detachment of emboli.

On the supposition that phlegmasia dolens was the result of inflammation of the veins of the affected limb, an anti-phlogistic course of treatment was naturally adopted. Accordingly, most writers on the subject recommend depletion, generally by the application of leeches, along the course of the affected vessels. We are told that if the pain continue the leeches should be applied a second, or even a third time. If we admit the septic origin of the disease we must, I think, see the impropriety of such a practice. The fact that it occurs, in a large majority of cases, in patients of a weakly and debilitated constitution, often in women who have already suffered from hæmorrhage, is a further reason for not adopting this routine custom. If local loss of blood be used at all, it should be strictly limited to cases in which there is much tenderness and redness along the course of the veins, and then only in patients of plethoric habit and strong constitution; cases of this kind will form a very small minority of those coming under our observation.

Treatment.

Depletion.

What has been said of the pathology of the affection

Over-
active
treatment
unadvis-
able.

tends to the conclusion that active treatment of any kind, in the hope of curing the disease, is likely to be useless. Our chief reliance must be on time and perfect rest, in order to admit of the thrombi and the secondary effusion being absorbed; while we relieve the pain and other prominent symptoms, and support the strength and improve the constitution of the patient.

Relief of
pain, &c.

The constant application of heat and moisture to the affected limb will do much to lessen the tension and pain. Wrapping the entire limb in linseed-meal poultices, frequently changed, is one of the best means of meeting this indication. If, as is sometimes the case, the weight of the poultices be too great to be readily borne, we may substitute warm flannel stupes, covered with oiled silk. Local anodyne applications afford much relief, and may be advantageously used along with the poultices and stupes, either by sprinkling their surface freely with laudanum, or chloroform and belladonna liniment, or by soaking the flannels in poppy-head fomentation. It is needless to say that the most absolute rest in bed should be enjoined, even in slight cases, and that the limb should be effectually guarded from undue pressure by a cradle or some similar contrivance. Local counter-irritation has been strongly recommended, and frequent blisters have been considered by some to be almost specific. I should myself hesitate to use blisters, as they would certainly not be soothing applications, and one hardly sees how they can be of much service in hastening the absorption of the effusion.

Constitu-
tional
treatment-

During the acute stage of the disease the constitutional treatment must be regulated by the condition of the patient. Light, but nutritious diet, must be administered in abundance, such as milk, beef-tea, and soups. Should there be much debility, stimulants in moderation may prove of service. With regard to medicines, we will probably find benefit from such as are calculated to improve the condition of the blood and the general health of the patient. Chlorate of potash, with dilute hydrochloric acid, quinine, either alone or in combination with sesquicarbonate of ammonia, the tincture of the perchloride of iron, are the drugs that are most likely to prove of service. Alkalies and other medicines, which have been recommended in the hope of hastening the absorption

of coagula, must be considered as altogether useless. Pain must be relieved by the judicious use of anodynes, such as Dover's powder at bed-time, the sub-cutaneous injection of morphia, or chloral to produce sleep. Generally no form answers so well as the hypodermic injection of morphia.

When the acute symptoms have abated, and the temperature has fallen, the poultices and stupes may be discontinued, and the limb swathed in a flannel roller from the toes upwards. The equable pressure and support thus afforded materially aid the absorption of the effusion, and tend to diminish the size of the limb. At a still later stage very gentle inunctions of weak iodine ointment may be used with advantage once a day before the roller is applied. Shampooing and friction of the limb, generally recommended for the purpose of hastening absorption, should be carefully avoided, on account of the possible risk of detaching a portion of the coagulum, and producing embolism. This is no merely imaginary danger, as the following fact narrated by Trousseau proves. 'A phlegmasia alba dolens had appeared on the left side in a young woman suffering from peri-uterine plegmon. The pain having ceased, a thickened venous trunk was felt on the upper and internal part of the thigh. Rather strong pressure was being made, when M. Demarquay felt something yield under his fingers. A few minutes afterwards the patient was attacked with dreadful palpitation, tumultuous cardiac action, and extreme pallor, and death was believed to be imminent. After some hours, however, the oppression ceased, and the patient eventually recovered. A slightly attached coagulum must have become separated, and conveyed to the heart or pulmonary artery.¹ Warm douches of water, of salt water if it can be obtained, may be advantageously used in the later stages of the disease, and they may be applied night and morning, the limb being bandaged in the interval. The occasional use of the electric current is said to promote absorption, and would seem likely to be a serviceable remedy.

Subsequent local treatment.

When the patient is well enough to be moved, a change of air to the seaside will be of value. Great caution, however, should be recommended in using the limb, and it is far

Change of air, &c.

• ¹ Trousseau, *Clinique de l'Hôtel Dieu in Gaz. des Hôp.* 1860, p. 577.

better not to run the risk of a relapse by any undue haste in this respect. It is well to warn the patient and her friends, that a considerable time must of necessity elapse, before the local signs of the disease have completely disappeared.

CHAPTER X.

PELVIC CELLULITIS AND PELVIC PERITONITIS.

FROM the earliest time the occurrence after parturition of severe forms of inflammatory disease in and about the pelvis, frequently ending in suppuration, has been well known. It is only of late years, however, that these diseases have been made the subject of accurate clinical and pathological investigation, and that their true nature has begun to be understood. Nor is our knowledge of them as yet by any means complete. They merit careful study on the part of the accoucheur, for they give rise to some of the most severe and protracted illnesses from which puerperal patients suffer. They are often obscure in their origin and apt to be overlooked, and they not rarely leave behind them lasting mischief.

These diseases have been recognised from the earliest times.

These diseases are not limited to the puerperal state. On the contrary, many of the severest cases arise from causes altogether unconnected with child-bearing. These will not be now considered, and this chapter deals solely with such forms as may be directly traced to child-birth.

They are not limited to the puerperal state.

Recent researches have demonstrated that there are two distinct varieties of inflammatory disease met with after labour, which differ materially from each other in many respects. In one of these, the inflammation affects chiefly the connective tissue surrounding the generative organs contained within the pelvis, or extends up from it beneath the peritoneum, and into the iliac fossæ. In the other, it attacks that portion of the peritoneum which covers the pelvic viscera, and is limited to it.

Two distinct forms of inflammatory disease are met with.

So much is admitted by all writers, but great obscurity in description, and consequent difficulty in understanding satisfactorily the nature of these affections, have resulted from the variety of nomenclature which different authors have adopted.

Variety of nomenclature which has been adopted.

Thus the former disease has been variously described as pelvic cellulitis, peri-uterine phlegmon, para-metritis, or pelvic abscess, while the latter is not unfrequently called peri-metritis, as contra-distinguished from para-metritis. The use of the prefix *para* or *peri*, to distinguish the cellular or peritoneal variety of inflammation, originally suggested by Virchow, has been pretty generally adopted in Germany, and has been strongly advocated in this country by Matthews Duncan. It has never, however, found much favour with English writers, and the similarity of the two names is so great, as to lead to confusion. I have, therefore, selected the terms '*pelvic peritonitis*,' and '*pelvic cellulitis*,' as conveying in themselves a fairly accurate notion of the tissues mainly involved.

Importance
of distin-
guishing
the two
classes of
cases.

The important fact to remember is that there exist two distinct varieties of inflammatory disease, presenting many similarities in their course, symptoms, and results, often occurring simultaneously, but in the main distinct in their pathology, and capable of being differentiated. Thomas compares them—and, as serving to fix the facts on the memory, the illustration is a good one—to pleurisy and pneumonia. 'Like them,' he says, 'they are separate and distinct, like them affect different kinds of structure, and like them they generally complicate each other.' It might, therefore, be advisable, as most writers on the disease occurring in the non-puerperal state have done, to treat of them in two separate chapters. There is, however, more difficulty in distinguishing them as puerperal than as non-puerperal affections, for which reason, as well as for the sake of brevity, I think it better to consider them together, pointing out, as I proceed, the distinctive peculiarities of each.

Sent of
disease.

When attention was first directed to this class of disease, the pelvic cellular tissue was believed to be the only structure affected. This was the view maintained by Nonat, Simpson, and many modern writers. The attention of the profession was first prominently directed to the importance of localised inflammation of the peritoneum, and to the fact that many of the supposed cases of cellulitis were really peritonic, by Bernutz. There can be no doubt that he here made an enormous step in advance. Like many authors, however, he rode his hobby a little too hard, and he erred in

denying the occurrence of cellulitis in many cases in which it undoubtedly exists.

The great influence of child-birth in producing these diseases has long been fully recognised. Courty estimates that about two-thirds of all the cases met with occur in connection with delivery or abortion, and Duncan found that out of 40 carefully observed cases, 25 were associated with the puerperal state.

Etiology.

It is pretty generally admitted by most modern writers that both varieties of the disease are produced by the extension of inflammation from either the uterus, the fallopian tubes, or the ovaries. This point has been especially insisted on by Duncan, who maintains that the disease is never idiopathic, and is 'invariably secondary either to mechanical injury or to the extension of inflammation of some of the pelvic viscera, or to the irritation of the noxious discharges through or from the tubes or ovaries.'

The inflammation is secondary and never idiopathic.

Their intimate connection with puerperal septicæmia is also a prominent fact in the natural history of the diseases. Barker mentions a curious observation illustrative of this, that when puerperal fever is endemic in the Bellevue Hospital in New York, cases of pelvic peritonitis and cellulitis are also invariably met with. As inflammation of the lining membrane of the uterus, of the vaginal mucous membrane, and of the pelvic connective tissue, are of very constant occurrence as local phenomena of septic absorption, the connection between the two classes of cases is readily susceptible of explanation. Schröder, indeed, goes further, and includes his description of these diseases under the head of puerperal fever. They do not, however, necessarily depend upon it; for, although it must be admitted that cases of this kind form a large proportion of those met with, others unquestionably occur which cannot be traced to such sources, but are the direct result of causes altogether unconnected with the inflammation attending on septic absorption, such as undue exertion shortly after delivery, or premature coition. Mechanical causes may beyond doubt excite the disease in a woman predisposed by the puerperal process, but they cannot fairly be included under the head of puerperal fever.

They are often intimately connected with septicæmia.

- Abundance of areolar tissue exists in connection with the

Seat of
the in-
flamma-
tion in
pelvic
cellulitis.

pelvic viscera, which may be the seat of cellulitis. It forms a loose padding between the organs contained in the pelvis proper, surrounds the vagina, the rectum, and the bladder, and is found in considerable quantity between the folds of the broad ligaments. From these parts it extends upwards to the iliac fossæ, and the inner surface of the abdominal parietes. In any of these positions it may be the seat of the kind of inflammation we are discussing. The essential character of the inflammation is similar to that which accompanies areolar inflammation in other parts of the body. There is first an acute inflammatory œdema, followed by the infiltration of the areolæ of the connective tissue with exudation, and the consequent formation of appreciable swellings. These may form in any part of the pelvis. Thus we may meet with them, and this is a very common situation, between the folds of the broad ligaments, forming distinct hard tumours, connected with the uterus, and extending to the pelvic walls, their rounded outlines being readily made out by bi-manual examination. If the cellulitis be limited in extent, such a swelling may exist on one side of the uterus only, forming a rounded mass of varying size, and apparently attached to it. At other times the exudation is more extensive, and may completely or partially surround the uterus, extending to the cellular tissue between the vagina and rectum, or between the uterus and the bladder. In such cases the uterus is imbedded and firmly fixed in dense, hard exudation. At other times, the inflammation chiefly affects the cellular tissue covering the muscles lining the iliac fossæ. There it forms a mass, easily made out by palpation, but on vaginal examination little or no trace of the exudation can be felt, or only a sense of thickness at the roof of the vagina on the same side as the swelling.

Seat of the
inflamma-
tion in
pelvic
peritonitis.

In pelvic peritonitis the inflammation is limited to that portion of the peritoneum which invests the pelvic viscera. Its extent necessarily varies with the intensity and duration of the attack. In some cases there may be little more than irritation, while more often it runs on to exudation of plastic material. The result is generally complete fixation of the uterus, and hardening and swelling in the roof of the vagina, and the lymph poured out may mat together the surrounding viscera, so as to form swellings, difficult, in some

cases, to differentiate from those resulting from cellulitis. On post-mortem examination the pelvic viscera are found extensively adherent, and the agglutination may involve the coils of the intestine in the vicinity, so as sometimes to form tumours of considerable size.

The relative frequency of these two forms of inflammation as puerperal affections is not easy to ascertain. In the non-
puerperal state the peritonitic variety is much the more common, but in the puerperal state this is not so sure. They very generally complicate each other, and it is rare for cellulitis to exist to any great extent without more or less peritonitis.

Relative frequency of the two forms of disease.

✓ The earliest symptom is pain in the lower part of the abdomen, which is generally preceded by rigor or chilliness. The amount of pain varies much. Sometimes it is comparatively slight, and it is by no means rare to meet with patients, who are the subjects of very considerable exudations, who suffer little more than a certain sense of weight and discomfort at the lower part of the abdomen. On the other hand the suffering may be excessive, and is characterised by paroxysmal exacerbations, the patient being comparatively free from pain for several successive hours, and then having attacks of the most acute agony. Schröder says that pain is always a symptom of peritonitis, and that it does not exist in uncomplicated cellulitis. The swellings of cellulitis are certainly sometimes remarkably free from tenderness, and I have often seen masses of exudation in the iliac fossæ, which could bear even rough handling. On the other hand, although this is certainly more often met with in non-
puerperal cases, the tenderness over the abdomen is sometimes excessive, the patient shrinking from the slightest touch. The pulse is raised, generally from 100 to 120, and the thermometer shows the presence of pyrexia. During the entire course of the disease both these symptoms continue. The temperature is often very high, but more frequently it varies from 100° to 104°, and it generally shows more or less marked remissions. In some cases the temperature is said not to be elevated at all, or even to be sub-normal, but this is certainly quite exceptional. Other signs of local and general irritation often exist. Among them, and most distinctly in cases of peritonitis, are nausea and vomiting, and an anxious

Symptomatology.

Pain is probably symptomatic of peritoneal complication.

pinched expression of the countenance, while the local mischief often causes distressing dysuria and tenesmus. The latter is especially apt to occur when there is exudation between the rectum and vagina, which presses on the bowel. The passage of fæces, unless in a very liquid form, may then cause intolerable suffering.

The symptoms are often insidious in their onset.

Such symptoms may show themselves within a few days after delivery, and then they can hardly fail to attract attention. On the other hand, they may not commence for some weeks after labour, and then they are often insidious in their onset, and apt to be overlooked. It is far from rare to meet with cases six weeks or more after confinement, in which the patient complains of little beyond a feeling of malaise and discomfort, in which, on investigation, a considerable amount of exudation is detected, which had previously entirely escaped observation.

Results of physical examination.

On introducing the finger into the vagina it will be found to be hot and swollen, in some cases distinctly cedematous, and on reaching the vaginal cul de sacs the existence of exudation may generally be made out. The amount of this varies much. Sometimes, especially in the early stage of the disease, there is little more than a diffuse sense of thickness and induration at either side of, or behind, the uterus. More generally careful bi-manual examination enables us to detect a distinct hardening and swelling, possibly a tumour of considerable size, which may apparently be attached to the sides of the uterus, and rise above the pelvic brim, or may extend quite to the pelvic walls. The examination should be very carefully and systematically conducted with both hands, so as to explore the whole contour of the uterus before, behind, and on either side, as well as the iliac fossæ; otherwise a considerable exudation might readily escape detection. When the exudation is at all great, more or less fixity of the uterus is sure to exist, and is a very characteristic symptom. The womb, instead of being freely moveable by the examining finger, is firmly fixed by the surrounding exudation, and in severe forms of the disease is quite encased in it. More or less displacement of the organ is also of common occurrence. If the swelling be limited to one side of the pelvis or to Douglas's space, the uterus is displaced in the opposite direction, so that it is no longer in its usual central position.

The womb is generally fixed and often displaced.

The differential diagnosis of pelvic cellulitis and pelvic peritonitis cannot always be made, and, indeed, in many cases it is impossible, since both varieties of disease co-exist. The elements of differentiation generally insisted on are, the greater general disturbance, nausea, &c., in pelvic peritonitis, with an earlier commencement of the symptoms after labour. The swellings of pelvic-peritonitis are also more tender, with less clearly-defined outline than those of cellulitis. When the cellulitis involves the iliac fossa the diagnosis is, of course, easy, and then a continuous retraction of the thigh on the affected side (an involuntary position assumed with the view of keeping the muscles lining the iliac fossa at rest), is often observed. When the inflammation is chiefly limited to the cavity of the pelvis, the distinction between the two classes of cases cannot be made with any degree of certainty.

The two forms of disease cannot always be distinguished.

Both forms of disease may end either in resolution or in suppuration. In the former case, after the acute symptoms have existed for a variable time, it may be for a few days only, it may be for many weeks, their severity abates, the swellings become less tender and commence to contract, become harder, and are gradually absorbed; until, at last, the fixity of the uterus disappears, and it again resumes its central position in the pelvic cavity. This process is often very gradual. It is by no means rare to find a patient, even some months after the attack, when all acute symptoms have long disappeared, who is even able to move about without inconvenience, in whom the uterus is still immovably fixed in a mass of deposit, or is, at least, adherent in some part of its contour. More or less permanent adhesions are of common occurrence, and give rise to symptoms of considerable obscurity, which are often not traced to their proper source.

Terminations.

When the inflammation is about to terminate in suppuration, the pyrexial symptoms continue, and eventually well-marked hectic is developed, the temperature generally showing a distinct exacerbation at night. At the same time rigors, loss of appetite, a peculiar yellowish discoloration of the face, and other signs of suppuration, show themselves. The relative frequency of this termination is variously estimated by authors. Duncan quotes Simpson as calculating it as occurring in half the cases of pelvic cellulitis,

Symptoms of suppuration.

Frequency
of suppu-
ration.

but states his own belief that it 'is much more frequent. West observed it in 23 out of 43 cases following delivery or abortion, and McClintock in 37 out of 70. Schröder says that he has only once seen suppuration in 92 cases of distinctly demonstrable exudation, a result which is certainly totally opposed to common experience. Barker also states that in his experience suppuration in either pelvic peritonitis or cellulitis 'is very rare, except when they are associated with pyæmia or puerperal fever.' It is certain that suppuration is more likely to occur in pelvic cellulitis than in pelvic peritonitis, but it unquestionably occurs, in this country at least, much more frequently than the statements of either of these authors would lead us to suppose.

Channels
through
which pus
may es-
cape.

The pus may find an exit through various channels. In pelvic cellulitis, more especially when the areolar tissue of the iliac fossa is implicated, the most common site of exit is through the abdominal wall. It may, however, open at other positions, and the pus may find its way through the cellular tissue and point at the side of the anus, or in the vagina, or it may take even a more tortuous course and reach the inner surface of the thigh. Pelvic abscesses not uncommonly open into the rectum or bladder, causing very considerable distress from tenesmus or dysuria. According to Hervieux, it is chiefly the peritoneal varieties which open in this way. Not unfrequently more than one opening is formed; and when the pus has burrowed for any distance, long fistulous tracts result, which secrete pus for a length of time, and are very slow to heal. Rupture of an abscess into the peritoneal cavity, especially of a peritonitic abscess, is a possible (but fortunately a very rare) termination, and will generally prove fatal by producing general peritonitis. In one case which I have recorded in the fifteenth volume of the 'Obstetrical Transactions' suppuration was followed by extensive necrosis of the pelvic bones. Two similar cases are related by Trousseau in his 'Clinical Medicine,' but I have not been able to meet with any other examples of this rare complication, which was probably rather the result of some obscure septicæmic condition than of extension of the inflammation.

Prognosis.

The prognosis is favourable as regards ultimate recovery, but there is great risk of a protracted illness which may

seriously impair the health of the patient, especially if suppuration result. Hence it is necessary to be guarded in an expression of opinion as to the consequences of the disease. Secondary mischief is also far from unlikely to follow, from the physical changes produced by the exudation, such as permanent adhesions or malpositions of the uterus, or organic alterations in the ovaries or Fallopian tubes.

In the treatment of both forms of disease the important indications to bear in mind are the relief of pain and the necessity of absolute rest; and to these objects all our measures must be subordinate, since it is quite hopeless to attempt to cut short the inflammation by any active medication.

Treat-
ment.

If the disease be recognised at a very early stage, the local abstraction of blood, by the application of a few leeches to the groin or to the hemorrhoidal veins, may give relief; but the influence of this remedy has been greatly exaggerated, and when the disease is of any standing it is quite useless. Leeches to the uterus, often recommended, are, I believe, likely to do more harm than good (unless in very skilful hands), from the irritation produced by passing the speculum. Opiates in large doses may be said to be our sheet anchor in treatment whenever the pain is at all severe, either by the mouth, in the form of morphia suppositories, or injected subcutaneously. In the not uncommon cases in which pain comes on severely in paroxysms, the opiates should be administered in sufficient quantity to lull the pain, and it is a good plan to give the nurse a supply of morphia suppositories (which often act better than any other form of administering the drug), with directions to use them immediately the pain threatens to come on. When there is much pyrexia large doses of quinine may be given with great advantage, along with the opiates. The state of the bowels requires careful attention. The opiates are apt to produce constipation, and the passage of hardened fæces causes much suffering. Hence it is desirable to keep the bowels freely open. Nothing answers this purpose so well as small doses of castor-oil, such as half a tea-spoonful given every morning. Warmth and moisture constantly applied to the lower part of the abdomen give great relief, either in the form of large poultices of linseed meal or, if these prove too heavy, of spongeo-piline soaked in boiling water. The poultices may

Local ab-
straction
of blood.

Use of
opiates.

Attention
to the
state of
the bowels.

Warmth
and mois-
ture.

be advantageously sprinkled with *claudanum* or *belladonna* liniment. I say nothing of the use of mercurials, iodide of potassium, and other so-called absorbent remedies, since I believe them to be quite valueless, and apt to divert attention from more useful plans of treatment.

Importance of rest.

The most absolute rest in the recumbent position is essential, and it should be persevered in for some time after the intensity of the symptoms is lessened. The beneficial effects of rest in alleviating pain is often seen in neglected cases, the nature of which has been overlooked, instant relief following the laying up of the patient.

Counter-irritation.

When the acute symptoms have lessened, absorption of the exudation may be favoured, and considerable relief obtained, from counter-irritation, which should be gentle and long-continued. The daily use of tincture of iodine until the skin peels, perhaps best meets this indication; but frequently-repeated fly blisters are often very serviceable. This I believe to be a better plan than keeping up an open sore with savine ointment or similar irritating applications.

Opening of pelvic abscesses.

When suppuration is established the question of opening the abscess arises. When this points in the groin, and the matter is superficial, a free incision may be made, and here, as in mammary abscess, the antiseptic treatment is likely to prove very serviceable. The abscess should, however, not be opened too soon, and it is better to wait until the pus is near the surface. The importance of not being in too great a hurry to open pelvic abscesses has been insisted on by West, Duncan, and other writers, and I have no doubt the rule is a good one. It is more especially applicable when the abscess is pointing in the vagina or rectum, where exploratory incisions are apt to be dangerous, and when the presence of pus should be positively ascertained before operating. We have in the aspirator a most useful instrument in the treatment of such cases, which enables us to remove the greater part of the pus without any risk, and the use of which is not attended with danger, even if employed prematurely. If it do not sufficiently evacuate the abscess, a free opening can afterwards be safely made with the bistoury. The surgical treatment of pelvic abscess is, however, too wide a subject to admit of being satisfactorily treated here.

The diet should be abundant, but simple and nutritious.

In the early stages of the disease, milk, beef-tea, eggs, and the like, will be sufficient. After suppuration a large quantity of animal food is required, and a sufficient amount of stimulant. The drain on the system is then often very great, and the amount of nourishment patients will require and assimilate, when a copious purulent discharge is going on, is often quite remarkable. A general tonic plan of medication will also be required, and such drugs as iron, quinine, and cod liver-oil, will prove useful.

Diet and
regimen.

INDEX.

ABD

- ABDOMEN**, adipose enlargement of, i. 163; enlargement of as a sign of pregnancy, i. 150; state of after delivery, ii. 247
- Abdominal pregnancy.** (*See Extra-uterine pregnancy.*)
- Abortion**, i. 270; causes of, i. 272; difficulty in procuring artificial, i. 277; liability to recurrence of, i. 271; retention of secundines in, i. 278 and 283; symptoms of, i. 278; treatment of, i. 279; production of in vomiting of pregnancy, i. 214
- Abscess of mammae.** (*See Mammary abscess.*)
- Abscess pelvis.** (*See Pelvic cellulitis.*)
- After-pains**, ii. 248; treatment of, ii. 250
- Age**, influence of, in labour, ii. 5
- Albuminuria** in pregnancy, i. 220; relation of, to eclampsia, ii. 278; relation of, to puerperal insanity, ii. 292
- Allantois**, i. 93
- Amnion**, formation of, i. 91; pathology of, i. 260; structure of, i. 95
- Amputations (intra-uterine)**, i. 266
- Anæmia**, in pregnancy, i. 219
- Anæsthesia**, in labour, i. 243; in forceps operations, ii. 179; value of, in difficult cases of turning, ii. 168
- Anasarca**, in pregnancy, i. 223
- Ante-version of the gravid uterus**, i. 234
- Apoplexy**, during or after labour, ii. 274 and 351
- Arbor vitæ**, i. 34
- Area germinativa**, i. 90
- Area pellucida**, i. 90
- Areolæ**, i. 58; changes of, during pregnancy, i. 147
- Arm**, presentation of (*see Shoulder presentation*); dorsal displacement of, i. 389
- Artificial respiration** in cases of apparent still-birth, ii. 255
- Ascites**, as a cause of dystocia, ii. 46
- Asphyxia (idiopathic)**, ii. 257
- Auscultatory signs of pregnancy**, i. 155

CER

- BAGS (Barnes's).** (*See Dilators.*)
- Ballottement**, i. 153
- Bi-lobed uterus**, gestation in, i. 204
- Binder**, uses of, i. 341
- Bladder**, distension of, as a cause of protracted labour, ii. 6; state of, after delivery, ii. 250
- Blasto-dermic membrane**, i. 83; division and layers of, i. 90
- Blood**, alteration in, after delivery, ii. 242
- Blood-diseases** transmitted to fœtus, i. 262
- Blunt-hook**, in breech presentation, i. 361
- Bowels**, action of, after delivery, ii. 252
- Breech presentations.** (*See Pelvic presentations.*)
- Broad ligaments of uterus**, i. 44
- Bronchitis**, as a cause of protracted labour, ii. 6
- Brow presentations**, i. 374
- CÆSAREAN** section, ii. 211; causes of mortality after, ii. 217; causes requiring the operation, ii. 214; description of, ii. 222; history of, ii. 211; post-mortem operation, ii. 216; results to child in, ii. 213; statistics of, ii. 213; substitutes for, ii. 225
- Calculus of bladder** obstructing labour, ii. 28
- Caput succedaneum**, i. 321
- Carcinoma**, in pregnancy, i. 243; obstructing labour, ii. 21
- Caries of teeth** in pregnancy, i. 217
- Carunculæ myrtiformes**, i. 26
- Catheter**, introduction of, i. 25
- Caul**, i. 299
- Cellulitis, pelvic.** (*See Pelvic cellulitis.*)
- Cephalotribe**, ii. 196
- Cephalotripsy.** (*See Craniotomy.*)
- Cervix uteri**, i. 33; alterations of, after childbirth, i. 33; cavity of, i. 34; dilatation of, in labour, i. 292; im-

CHI

- paction of, before foetal head. i. 331;
incision of, for rigidity, ii. 22; modification of, by pregnancy, i. 132;
mucous membrane of, i. 39; organic causes of rigidity, ii. 21; rigidity of, as a cause of protracted labour, ii. 18; treatment of rigidity, ii. 19; villi of, i. 40
- Child (the new born). (*See* Infant.)
- Child, risks to, in forceps operations, ii. 188
- Childbirth, mortality of, ii. 241
- Chloral, in labour, i. 343; in rigidity of cervix, ii. 19
- Chloroform, in labour, i. 345; in difficult cases of turning, i. 268; in rigidity of cervix, ii. 19
- Chorea, in pregnancy, i. 228
- Chorion, i. 97; vesicular degeneration of, i. 251
- Circulation of foetus, i. 123
- Cleavage of yolk, i. 82
- Clitoris, i. 24
- Coccyx, i. 4; ligaments of, i. 6; ossification of, i. 5; mobility of, i. 5
- Colostrum, ii. 257
- Conception, signs of, i. 143
- Constipation, in pregnancy, i. 215
- Continued fever, in pregnancy, i. 242
- Convulsions (puerperal). (*See* Eclampsia.)
- Corps reticulé, i. 94
- Corpus Luteum, i. 63
- Cranioclast, ii. 195
- Craniotomy, ii. 192; cases requiring, ii. 198; comparative merits of, and cephalotripsy, ii. 203; description of cephalotripsy, ii. 205; extraction of head by craniotomy forceps, ii. 207; method of perforating, ii. 201; perforators, ii. 193; perforation of aftercoming head, ii. 202; religious objections to, ii. 192
- Craniotomy forceps, ii. 194
- Crotchets, ii. 194
- Cystocele, obstructing labour, ii. 27

DEATH, apparent of new-born child, (*See* Infant.)

- Death, sudden, during labour and the puerperal state, ii. 351; from air in the veins, ii. 352; functional causes of, ii. 352; organic causes of, ii. 351
- Decapitation of foetus, ii. 208
- Decidua, i. 84; at end of pregnancy, and after delivery, i. 89; cavity between d. vera and reflexa, i. 88; divisions of, i. 84; fatty degeneration of as the cause of labour, i. 288; formation of d. reflexa, i. 86; structure of, i. 85

EPI

- Delivery, state of patient after, ii. 242; contraction of uterus after, ii. 245; management of patient after, ii. 249; nervous shock after, ii. 242; prediction of date of, i. 168; signs of recent, i. 173; state of pulse after ii. 243; weight of uterus after, ii. 246
- Diameters, of foetal skull, i. 113; of pelvis, i. 12
- Diarrhæa, in pregnancy, i. 215
- Diet, of lying-in women, ii. 250
- Dilators (caoutchouc), in the induction of premature labour, ii. 144; in rigidity of cervix, ii. 20
- Diseases of pregnancy, i. 209; albuminuria, i. 220; anaemia and chlorosis, i. 219; carcinoma, i. 243; cardiac diseases, i. 242; chorea, i. 228; constipation, i. 215; diarrhæa, i. 215; disorders of the nervous system, i. 226; respiratory organs, i. 218; teeth, i. 217; urinary system, i. 229; displacements of the gravid uterus, i. 233; epilepsy, i. 242; eruptive fevers, i. 240; fibroid tumours, i. 246; hæmorrhoids, i. 217; icterus, i. 243; leucorrhæa, i. 231; ovarian tumour, i. 244; palpitation, i. 218; paralysis, i. 227; pneumonia, i. 241; pruritus, i. 231; ptyalism, i. 217; syncope, i. 219; syphilis, i. 242; varicose veins, i. 232; vomiting (excessive), i. 209
- Dropsies, affecting the foetus, i. 265
- Ductus, arteriosus, i. 124; venosus, i. 124
- Dystocia, from foetus, ii. 33
- ECLAMPSIA**, ii. 274: cause of death in, ii. 278; condition of patient between the attacks, ii. 276; confusion from defective nomenclature, ii. 274; exciting causes of, ii. 281; obstetric management in, ii. 285; pathology of, ii. 278; premonitory symptoms of, ii. 275; relation of, to labour, ii. 277; results to mother and child in, ii. 277; symptoms of, ii. 275; transfusion in, ii. 230; Traube and Rosenstein's theory of, ii. 280; treatment of, ii. 281; uræmic theory of, ii. 279
- Écraseur, use of, as a substitute for craniotomy, ii. 198
- Embolism. (*See* Thrombosis.)
- Embryotomy, ii. 208
- Emotions, mental, as a cause of protracted labour, ii. 6
- Epilepsy, in pregnancy, i. 242
- Epileptic convulsions, ii. 274

ERG

- Ergot** of rye, ii. 9; as a means of inducing labour, ii. 143; objections to use of, ii. 9; mode of administration, ii. 9; value of, after delivery, i. 340
- Eruptive fevers** in pregnancy, i. 240
- Erysipelas**, as a cause of puerperal septicæmia, ii. 241
- Exhaustion**, importance of distinguishing between temporary and permanent in labour, ii. 9
- Expression**, uterine. (*See* Pressure.)
- of the placenta, i. 338
- Extra-uterine pregnancy**, i. 184; abdominal variety of, i. 195; causes of, i. 186; changes in the fœtus in, i. 198; classification of, i. 185; diagnosis of abdominal variety, i. 199; diagnosis of tubal variety, i. 191; gastrotomy in, i. 195, 201; pseudo-labour in, i. 197; symptoms of rupture in, i. 190; treatment after rupture, i. 194; treatment of abdominal variety, i. 200; tubal variety, i. 188; treatment of tubal variety, i. 193
- Evisceration**, ii. 210

FACE presentation, i. 363; causes of, i. 364; diagnosis of, i. 365; difficulties connected with, i. 373; erroneous views formerly entertained of, i. 363; mechanism of delivery in, i. 367; mento-posterior positions in, i. 370; prognosis in, i. 371; treatment of, i. 372

Fallopian tubes, i. 47

False pains, character and treatment of, i. 326

Faradisation, in apparent still birth, ii. 256

Fibroid tumour in pregnancy, i. 246; obstructing labour, ii. 24

Fillet, ii. 190; in breech presentations, i. 361; nature of the instrument, ii. 191; objections to its use, ii. 191

Fœtal head, anatomy of, i. 111; induction of premature labour, for large size of, ii. 140

Fœtal heart, sounds of in pregnancy, i. 155

Fœtus, anatomy and physiology of, i. 108; appearance of a putrid, i. 268; appearance of, at various stages of development, i. 108; at term, i. 110; circulation of, i. 123; changes in circulation of, as cause of labour, i. 287; changes in position of, during pregnancy, i. 115; death of, i. 269; detection of position in utero by palpation, i. 116; early viability of, i.

IÆM

270; excessive development of, as a cause of difficult labour, ii. 47; explanation of its position in utero, i. 117; functions of, i. 120; nutrition of, i. 120; pathology of, i. 262; position of, in utero, i. 114; respiration of, i. 122; signs and diagnosis of death of, i. 269, and ii. 201

Fontanelles, i. 111

Foot, diagnosis of, i. 351

Foot presentations. (*See* Pelvic presentations.)

Foramen Ovale, i. 123

Forceps, ii. 171; action of, ii. 177; advantages of pelvic curve in, ii. 173; application of, to after-coming head in breech presentations, i. 359; application of, within the cervix, ii. 22; cases in which a straight instrument should be used, ii. 173; dangers of, ii. 15 and 187; dangers of, to child, ii. 188; description of, ii. 171; description of the operation, ii. 180; difference between high and low operations, i. 178; disadvantages of a weak instrument, i. 176; frequent use of in modern practice, ii. 13 and 171; high operation, i. 185; long, i. 174; preliminary considerations before using, ii. 179; short, ii. 172; use of anæsthetics in forceps delivery, ii. 179; use of in deformed pelvis, ii. 70; use of in difficult occipito-posterior positions, i. 376; use of in protracted labour, ii. 13

Forceps-saw, ii. 197

Fossa navicularis, i. 27

Funis. (*See* Umbilical Cord.)

GALACTORRHEA, ii. 265

Galvanism as a means of inducing labour, ii. 144

Gangrene of limbs from arterial obstruction, ii. 349

Gastrotomy, after rupture of uterus, ii. 128; in extra uterine pregnancy, i. 195 and 201

Gastro-elytrotomy, ii. 226

Generative organs, in the female, i. 22; division according to function, i. 22

Germinal vesicle, disappearance of, after impregnation, i. 81

Gestation. (*See* Pregnancy.)

Graafian follicle, i. 53; structure of, i. 54

HÆMATOCELE, obstructing labour, ii. 26

Hæmorrhage, accidental, ii. 96; causes and pathology of, ii. 94; concealed

HÆM

- internal, ii. 96; diagnosis, prognosis, and treatment of concealed internal ii. 97; prognosis of, ii. 97; symptoms and diagnosis of, ii. 96; treatment of, ii. 97
- Hæmorrhage after delivery, ii. 99; causes of, ii. 100; constitutional predisposition to, ii. 105; curative treatment of, ii. 106; from laceration of maternal structures, ii. 114; nature's mode of preventing, i. 302; and ii. 100; preventive treatment of, ii. 106; secondary causes of, ii. 102; secondary treatment of, ii. 114; symptoms of, ii. 105; transfusion of blood in, ii. 115
- Hæmorrhage after delivery (secondary), ii. 115; distinction between and profuse lochial discharge, ii. 116; local causes of, ii. 116; treatment of, ii. 118
- Hæmorrhage, unavoidable. (*See Placenta prævia.*)
- Hæmorrhoids, in pregnancy, i. 216
- Hand-feeding, of infants, ii. 270; ass's milk in, ii. 271; causes of mortality in, ii. 270; cow's milk in, and its preparation, ii. 271; goat's milk in, ii. 271; method of, ii. 272
- Head presentations, i. 306; description of cranial positions in, i. 307; division of, i. 307; explanation of frequency of first position, i. 308; frequency of, i. 306; mechanism of 1st position, i. 311; of 2nd position, i. 317; of 3rd position, i. 318; of 4th position, i. 320; relative frequency of various positions, i. 308
- Heart, diseases of, in pregnancy, i. 242; hypertrophy of, in pregnancy, i. 139
- Hernia, in labour, ii. 28
- Hour-glass contraction of uterus, ii. 103
- Hydramnios, i. 260
- Hydatids of uterus, i. 254
- Hydrocephalus of fetus, as a cause of difficult labour, ii. 43
- Hydrorehea gravidarum, i. 250
- Hymen, i. 26
- Hysteria during labour, ii. 274

LAB

- of food of, ii. 272; washing and dressing of, ii. 256
- Infantile mortality, diminution of, as a reason for more frequent use of forceps, ii. 16
- Inflammatory diseases affecting the fetus, i. 265
- Insanity (puerperal), ii. 287; classification of, ii. 287; of lactation, ii. 295; of pregnancy, ii. 288; predisposing causes of, ii. 288; puerperal (proper), ii. 290; causes of, ii. 291; form of, ii. 296; prognosis of, ii. 294; post-mortem signs of, ii. 294; symptoms of, ii. 295; transient mania during delivery, ii. 290; treatment of, ii. 297; treatment during convalescence, ii. 301; question of removal to an asylum, ii. 301
- Insomnia in pregnancy, i. 226
- Intermittent fever affecting the fetus, i. 263
- Intestines, disorders of, as influencing labour, ii. 5
- Inversion of uterus. (*See Uterus.*)
- Irregular uterine contractions after labour, ii. 103; as a cause of lingering labour, ii. 7
- Irritable bladder in pregnancy, i. 230
- Ischium, planes of the, i. 18

JAUNDICE in pregnancy, i. 243

KISTINE, i. 141

- Knots on the umbilical cord, i. 260
- Knee presentation, i. 347
- Kyphotic deformity of pelvis, ii. 59

LABIA majora, i. 22

- Labia minora, i. 23
- Labour, i. 287; age, influence of, on, i. 303; anaesthesia in, i. 343; arrest of, i. 172; causes of, i. 287; causes of precipitate, ii. 17; causes of protracted, ii. 4; character and source of pain in, i. 29; character of false pains, i. 326; dilatation of cervix in, i. 292; duration of, i. 303; effect of uterine contractions in, i. 290; evil effects of protracted, ii. 1; induction of (*see Premature labour*); influence of stage of, in protracted, ii. 2; management of, in deformed pelvis, i. 69; management of natural, i. 323; management of third stage of, i. 336; mechanism of, in head presentation, i. 306; obstructed by faulty condition of the soft parts, ii. 18; period of

INDUCTION of premature labour. (*See Premature labour.*)

- Inertia of the uterus, frequent child-bearing as a cause of, ii. 6
- Infant, apparent death of, ii. 254; appearance of in cases of apparent death, ii. 254; clothing of, ii. 257; evils of over-suckling, ii. 259; management of, ii. 254; management of, when the food disagrees, ii. 273; treatment of apparent death of, ii. 255; various kinds

LAC

- day at which labour commences, i. 305; phenomena of, i. 287; position of patient during, i. 329; preparatory treatment, i. 323; precipitate, ii. 16; prolonged and precipitate, ii. 1; rupture of membranes in, i. 293; stages of, i. 297; symptoms of protracted, ii. 3; treatment of protracted, ii. 7
- Lactation, defective secretion of milk in, ii. 263; diet of nursing women during, ii. 261; excessive flow of milk in, ii. 265; importance of, to mother, ii. 258; importance of wet-nursing to child, ii. 259; insanity of, ii. 295; management of, ii. 260; means of arresting secretion of milk in, ii. 262; period of weaning in, ii. 262
- Laminae dorsales, i. 90
- Lead poisoning, affecting the fœtus, i. 264; as a cause of abortion, i. 276
- Lencorrhœa, in pregnancy, i. 231
- Lever. (*See Vectis.*)
- Liquor amnii, i. 96; uses of, i. 96; source of, i. 96; deficiency of, i. 262
- Lochia, ii. 247; variation in amount and duration of, ii. 248; occasional fœtor of, ii. 248
- Lying-in hospitals, mortality in, ii. 303
- Lypothemia, i. 219

- MALPRESENTATIONS**, peculiar form of bag of membranes in, i. 349
- Mammary changes during pregnancy, i. 147; their diagnostic value, i. 149
- Mammary glands, i. 57; their sympathetic relations with the uterus, i. 59
- Mammary abscess, ii. 266; anti-septic treatment of, ii. 268; signs and symptoms of, ii. 266; treatment of, ii. 267
- Mæsles, affecting the fœtus, i. 263; in pregnancy, i. 240
- Mæconium, i. 127
- Membranes, artificial rupture of, i. 329; puncture of, as a means of inducing labour, ii. 142
- Menstruation, i. 60; cessation of, i. 75; cessation of, during pregnancy, i. 144; changes in Graafian follicle after, i. 61; period of duration and recurrence, i. 68; purpose of, i. 74; sources of blood in, i. 70; theory of, i. 71; quantity of blood lost in, i. 68; vicarious, i. 74
- Milk, ass's, ii. 271; cow's, and its preparation, ii. 271; defective secretion of, ii. 263; excessive secretion of, ii. 265; goat's, ii. 271; means of arresting the secretion of, ii. 262; secretion of, after delivery, ii. 258
- Milk-fever, ii. 244

PAI

- Miscarriage. (*See Abortion.*)
- Missed labour, i. 205
- Moles, i. 274
- Morning sickness, i. 145
- Monstrosity (double), ii. 39; classification of, ii. 39; mechanism of delivery in, ii. 40
- Mons veneris, i. 22
- Montgomery's cups, i. 86
- Mucous membrane of uterus. (*See Uterus.*)
- Müller, canal of, i. 49

- NERVOUS** shock after delivery, ii. 242
- Nervous system, changes in, during pregnancy, i. 140; disorders of, in pregnancy, i. 226; excitability of, in puerperal women, ii. 281
- Neuralgia in pregnancy, i. 226
- Nipple, i. 58
- Nipples, depressed, ii. 264; fissures and excoriations of, ii. 265
- Nursing. (*See Lactation.*)
- Nutrition of fœtus, i. 120
- Nymphæ. (*See Labia minora.*)

- OBLIQUELY** contracted pelvis, ii. 58
- Obstetric bag, i. 325
- Occipito-posterior positions, difficult cases of, i. 375; causes of face to pubes delivery in, i. 376; forceps, in, i. 377; treatment of, i. 376; vectis or fillet in, i. 376
- Omphalo-mesenteric artery and vein, i. 92
- Opinties, use of, after delivery, i. 249
- Os innominatum, i. 2
- Osteomalacia, as a cause of deformity, i. 51
- Osteophytes, formation of, during pregnancy, i. 140
- Os uteri, dilatation of, as a means of inducing labour, ii. 144; occlusion of, in labour, ii. 21
- Ovarian pregnancy. (*See Extra uterine pregnancy.*)
- Ovarian tumour in pregnancy, i. 244
- Ovariectomy in pregnancy, i. 245
- Ovary, i. 49; functions of, i. 60; structure of, i. 57; vascular arrangements of, i. 56
- Ovum, i. 55; changes in, after impregnation, i. 81; changes in, when retained in utero after its death, i. 274; formation of, i. 53
- Oxytoxic remedies, ii. 9

- PAINS**, after-, ii. 248
- Pains, false, ii. 298

PAI

- Pains, labour (*see* Labour), ii. 248
 Pains, irregular and spasmodic as a cause of protracted labour, ii. 7
 Palpitation, in pregnancy, i. 218
 Pampiniform plexus, i. 41
 Paralysis in pregnancy, i. 227: from embolism of the cerebral arteries, ii. 349; from embolism of the main arteries of the limb, ii. 349
 Parovarium, i. 45
 Parturient canal, axis of, i. 16
 Pathology of decidua and ovum, i. 248
 Pelvis, alterations in articulations of, during pregnancy, i. 9; anatomy of, i. 1; articulations of, i. 5; axes of, i. 16; Cæsarean section in deformities of, ii. 74; causes of deformity of, ii. 50; comparative estimate of turning and forceps in deformity of, ii. 74; craniotomy in deformity of, ii. 74; diagnosis of deformity, ii. 66; deformities of, ii. 49; development of, i. 18 and 20; difference according to race, i. 20; difference in the two sexes, i. 10; division into true and false, i. 10; equally contracted, ii. 52; equally enlarged, ii. 52; forceps in deformity of, ii. 70; induction of premature labour in deformity of, ii. 74; infantile, i. 19; kyphotic, ii. 59; ligaments of, i. 6; masculine, ii. 53; mechanism of delivery in deformed, ii. 64; movements of the articulations of, i. 8; obliquely contracted, ii. 58; planes of, i. 15; Robert's, ii. 60; soft parts connected with, i. 20; tumours of, ii. 60; turning in deformity of, ii. 72; undeveloped, ii. 52.
 Pelvic cellulitis and peritonitis, ii. 366; etiology of, ii. 367; importance of distinguishing the two forms of disease, ii. 366; connection with septicæmia, ii. 367; opening of abscess in, ii. 374; prognosis of, ii. 372; relative frequency of the two forms of disease, ii. 369; results of physical examination, ii. 370; seat of inflammation in cellulitis, ii. 368; seat of inflammation in peritonitis, ii. 368; suppuration in, ii. 371; symptomatology, ii. 369; terminations of, ii. 371; treatment of, ii. 373; two distinct forms of disease, ii. 365
 Pelvic presentations, i. 347; application of forceps to the after-coming head in, i. 359; causes of, i. 347; danger to child in, i. 357; diagnosis of, i. 349; frequency of, i. 347; management of impacted breech in, i. 360; mechanism of, i. 351; prognosis in, i. 348; treatment of, i. 356

PRE

- Pelvimeters, various forms of, ii. 68
 Perchloride of iron, injection of, in post-partum hæmorrhage, ii. 113
 Perforators, ii. 193
 Perinæum, i. 27; distension of, in labour, i. 300 and 332; incision of, i. 334; laceration of, i. 335; relaxation of, i. 333; rigidity of, as a cause of protracted labour, ii. 24
 Peritonitis, pelvic. (*See* Pelvic cellulitis.)
 Peritonitis, puerperal. (*See* Septicæmia.)
 Phlegmasia dolens. (*See* Thrombosis, peripheral venous.)
 Placenta, i. 98; adhesion of, after delivery, ii. 164; degeneration of, i. 106; detachment of, in labour, i. 301; expression of, i. 338; fetal portion of, i. 100; form of, in man and animals, i. 98; functions of, i. 105; maternal portion of, i. 102; minute structure of, i. 99; pathology of, i. 256; sinus system of, i. 103; sounds produced during separation of, i. 161; treatment of adherent, ii. 110
 Placenta membranacea, i. 256
 Placenta prævia, ii. 78; causes of, ii. 78; causes of hæmorrhage in, ii. 82; natural termination of labour in, ii. 84; pathological changes of placenta in, ii. 84; prognosis in, ii. 86; sources of hæmorrhage in, ii. 81; summary of rules of treatment in, ii. 92; symptoms of, ii. 79; treatment of, ii. 87; turning in, ii. 167
 Placenta succenturia, i. 256
 Placenteritis, i. 257
 Plugging of vagina, i. 283
 Plural births, i. 176, and ii. 33; arrangement of placenta and membranes in, i. 179; causes of, i. 178; diagnosis of, i. 180; relative frequency of, in different countries, i. 117; sex of children in, i. 176; treatment of, ii. 33
 Pneumonia in pregnancy, i. 241
 Polar globule, i. 32
 Position of cranium in head presentation. (*See* Head presentations.)
 Post-partum hæmorrhage. (*See* Hæmorrhage after delivery.)
 Pregnancy, i. 129; abnormal, i. 176; alteration of colour of vaginal mucous membrane as a sign of, i. 155; ballottement as a sign of, i. 153; changes in the blood during, i. 138; changes in the liver, lymphatics, and spleen during, i. 140; changes in the urine during, i. 141; deposits of pigmentary matter during, i. 150; differential diagnosis of, i. 163; dress of patient in, i. 324; duration of, i.

PRE

- 167; enlargement of abdomen as a sign of, i. 150; extra-uterine (*see* extra-uterine pregnancy); foetal movements in, i. 161; formation of osteophytes during, i. 140; hypertrophy of the heart during, i. 139; in cases of double uterus, i. 43; in the absence of menstruation, i. 145; intermittent uterine contractions as a sign of, i. 152; pytalism in, i. 217; prolapse of the uterus in, i. 233; protraction of, i. 171; pruritus in, i. 281; quickening, i. 161; sickness of, i. 145; signs and diagnosis of, i. 143; sounds produced by the foetal movements in, i. 161; spurious, i. 165; sympathetic disturbances of, i. 145; uterine fluctuation in, i. 154; vaginal signs of, i. 153; vaginal pulsation in, i. 154
- Premature labour, i. 270; history of the operation of induction of, ii. 69; induction of, ii. 139; induction of in deformed pelvis, ii. 74; injection of carbonic acid gas as a means of inducing, ii. 147; insertion of flexible bougie as a means of inducing, ii. 148; objects of the operation of induction of, ii. 140; oxytoxics as a means of inducing, ii. 143; period for the induction of, in deformed pelvis, ii. 77; precautions as regards the child in the induction of, ii. 149; puncture of the membranes as a means of inducing, i. 142; separation of the membranes as a means of inducing, ii. 146; vaginal and uterine douches as a means of inducing, ii. 146
- Pressure, as a means of inducing uterine contractions, ii. 10; mode of applying, ii. 12
- Prolapse of umbilical cord. (*See* Umbilical Cord.)
- Pytalism, in pregnancy, i. 217
- Puerperal convulsions. (*See* Eclampsia.)
- Puerperal fever. (*See* Septicæmia.)
- Puerperal mania. (*See* Insanity.)
- Puerperal state, ii. 241; after-treatment in, ii. 253; diet and regimen in, ii. 250; diminution of uterus in, ii. 245; importance of prolonged rest in, ii. 252; secretions and excretions in, ii. 244; temperature in, ii. 243
- Pulmonary arteries, anatomical arrangement of, as favouring thrombosis, ii. 336
- Pulse, state of, after delivery, ii. 243

QUICKENING, i. 161

SIC

- RACE, as influencing the size of the foetal skull, i. 114
- Recto-vaginal fistula, ii. 129
- Respiration of foetus, i. 122
- Respiratory chamber, i. 82
- Retroversion of the gravid uterus, i. 235
- Rickets, as a cause of pelvic deformity, ii. 50
- Rosenmüller, organ of. (*See* Parovarium.)
- Round ligaments of the uterus, i. 46
- Rupture of Uterus. (*See* Uterus.)
- SACRUM, anatomy of, i. 3; mechanical relations of, i. 4
- Scarlet fever, affecting the foetus, i. 263; in pregnancy, i. 240; in the puerperal state, ii. 311
- Seybalæ in the rectum, obstructing labour, ii. 28
- Septicæmia (puerperal), ii. 302; bacteria in, ii. 316; channels of diffusion in, ii. 317; channels through which septic matter may be absorbed, ii. 307; conduct of practitioner in regard to, ii. 315; contagion from other puerperal patients as a cause of, ii. 313; description of, ii. 322; division into auto-genetic and hetero-genetic forms, ii. 308; epidemics of, ii. 304; history of, ii. 303; importance of anti-septic precautions in, ii. 316; influence of cadaveric poison as a cause of, ii. 309; influence of zymotic diseases in causing, ii. 311; its connection with pelvic cellulitis and peritonitis, ii. 367; local changes in, ii. 317; mode in which the poison may be conveyed to patients in, ii. 314; nature of septic poison, i. 316; pathological phenomena in, ii. 319; pyæmic forms of, ii. 325; sources of auto-infection in, ii. 309; sources of hetero-infection in, ii. 309; symptoms of the intense form, ii. 319; theory of an essential zymotic fever, ii. 305; theory of identity with surgical septicæmia, ii. 306; theory of local origin, ii. 305; transfusion of blood in, ii. 230; treatment of, ii. 235
- Sex, discovery of, of foetus during pregnancy, i. 157; of foetus as influencing the size of the skull, i. 114
- Shoulder presentations, i. 379; diagnosis of, i. 382; division of, i. 380; mechanism of, i. 385; prognosis and frequency of, i. 380; spontaneous version in, i. 385; treatment of, i. 388
- Sickness of pregnancy, i. 145

SMA

- Small-pox, affecting the fœtus, i. 263 ;
in pregnancy, i. 240
Smith's, Tyler, theory of labour, i. 289
Spontaneous evolution, i. 386
Spontaneous version, i. 385
Spondylolithesis, ii. 55
Spurious pregnancy, i. 165 ; diagnosis
of, i. 167 ; symptoms of, i. 166
Syncope, during or after labour, ii. 352 ;
in pregnancy, i. 219
Symphyseotomy, ii. 225
Syphilis, affecting the fœtus, i. 264 ; as
a cause of abortion, i. 276 ; in preg-
nancy, i. 242
Super-fecundation and super-fœtation, i.
181
Sutures of fœtal head, i. 111

TEMPERATURE after delivery, ii.
243

- Thrombosis (peripheral venous), ii. 355 ;
changes in thrombi in, ii. 361 ; con-
dition of the affected limb, ii. 356 ;
detachment of emboli in, ii. 361 ; his-
tory and pathology of, ii. 357 ; pro-
gress of the disease, ii. 356 ; symp-
toms of, ii. 355 ; treatment of, ii. 361
Thrombosis (puerperal), ii. 332 ; arte-
rial thrombosis and embolism, ii. 348 ;
curliac murmur in pulmonary, ii.
344 ; cases illustrating recovery from
pulmonary, ii. 341 ; causes of death
in pulmonary, ii. 344 ; clinical facts
in favour of pulmonary, ii. 337 ; con-
ditions which favour thrombosis in
the puerperal state, ii. 333 ; distinc-
tion between thrombosis and embol-
ism, ii. 335 ; phlegmasia dolens a
consequence of, ii. 332 ; post-mortem
appearance of clots in pulmonary, ii.
345 ; question of primary thrombosis
in the pulmonary arteries, ii. 336 ;
question of recovery from pulmonary,
ii. 339 ; symptoms of arterial, ii.
348 ; symptoms of pulmonary ob-
struction in, ii. 338 ; treatment of
arterial, ii. 350 ; treatment of pulmo-
nary, ii. 346

Thrombus. (See Hematocoele.)

Toothache, in pregnancy, i. 217

- Transfusion of blood, ii. 228 ; addition
of chemical re-agents to prevent co-
agulation of fibrine, ii. 233 ; cases
suitable for the operation, ii. 235 ;
dangers of the operation, ii. 235 ; de-
fibrination of blood in, ii. 233 ; difficul-
ties of the operation, ii. 231 ; effects
of successful transfusion, ii. 239 ;
history of the operation, ii. 239 ;
mediate transfusion ; ii. 232 ; method

UTE

- of injecting defibrinated blood, ii.
238 ; method of performing mediate
transfusion, ii. 236 ; method of pre-
paring defibrinated blood, ii. 237 ;
nature and object of the operation, ii.
230 ; secondary effects of, ii. 239 ;
statistical results of, ii. 234
Tropics, influence of residence in, on
labour, ii. 5
Trunk, presentation of. (See Shoulder
presentation.)
Tumours, diagnosis of uterine and ova-
rian, i. 165
Turnours, fœtal, i. 268 ; obstructing la-
bour, ii. 47
Tunica albuginea, i. 51.
Turning, ii. 150 ; anæsthesia in, ii. 157 ;
by combined method, ii. 159 ; by ex-
ternal manipulation only, ii. 153 ;
cases suitable for the operation, ii.
151 ; cases suitable for operating by
combined method, ii. 153 ; cephalic,
154 ; choice of hand to be used, ii.
157 ; history of the operation, ii. 150 ;
in abdomino-anterior positions, ii.
167 ; in deformed pelvis, ii. 72 ; in
placenta prævia, ii. 90 and 167 ; method
of cephalic, ii. 155 ; method of per-
forming by external manipulation, ii.
153 ; method of podalic, ii. 156 ; ob-
ject and nature of the operation, ii.
151 ; period when the operation
should be performed, ii. 157 ; podalic,
ii. 156 and 161 ; position of patient in,
ii. 156 ; statistics and dangers of, ii.
154 ; value of anæsthetics in difficult
cases of, ii. 169
Twins. (See Plural Births.)
Twins, conjoined, ii. 38
Twins, locked, ii. 35

UMBILICAL cord, i. 106 ; ligature of,
i. 336 ; pathology of, i. 259 ; pro-
lapse of, i. 390 ; (causes of, i. 391 ;
diagnosis of, i. 393 ; frequency of, i.
391 ; prognosis of, i. 392 ; postural
treatment of, i. 394 ; reposition of, i.
395

Umbilical souffle, i. 159

Umbilical vesicle, i. 92

Urachus, i. 94

Uremia, in connection with eclampsia,
ii. 278 ; in connection with puerperal
insanity, ii. 293

Urethra, i. 25

Urine, changes in, during pregnancy, i.
141 ; retention of, after delivery, ii.
250

Uterine fluctuation, as a sign of preg-
nancy, i. 154

UTE

Uterine souffle, i. 159.
 Utero-sacral ligaments, i. 47
 Uterus, i. 30; analogy of interior of after delivery and stump of an amputated limb, i. 90; anomalies of, i. 43; arrangement of muscular fibres of, i. 37; axis of, during pregnancy, i. 131; changes in cervix during pregnancy, i. 133 and 153; changes in form and dimensions of during pregnancy, i. 129; changes in mucous membranes of, after delivery, i. 246; changes in mucous membrane of, after impregnation, i. 84; changes in tissues of, during pregnancy, i. 136; congestive hypertrophy of, i. 164; contractions of, in labour, i. 292; dimensions of, i. 32; diminution in size of, after delivery, ii. 245; distension of, as a cause of labour, i. 288; distension of, by retained menses, i. 163; intermittent contractions of, during pregnancy, ii. 152; internal surface of, i. 34; inversion of, ii. 132; (differential diagnosis of, ii. 134; production of, ii. 135; results of physical examination in, ii. 133; symptoms of, ii. 132; treatment of, ii. 137;) fatty transformation of after delivery, ii. 246; ligaments of, i. 44; lymphatics of, i. 41; malposition of, as a cause of protracted labour, ii. 7; mode of action in labour, i. 292; mucous membrane of, i. 37; muscular fibres of, i. 36; nerves of, i. 42; regional division of, i. 33; relations of, i. 31; size of, at various periods of pregnancy, i. 130; state of in protracted labour, ii. 4; structures composing, i. 35; rupture of, ii. 120; (alterations of tissues in, ii. 122; causes of, ii. 121; coin-

ZYM

parative result of various methods of treatment in, ii. 128; prognosis of, ii. 125; seat of laceration in, ii. 120; symptoms of, ii. 124; treatment of, ii. 126 and 129; utricular glands of, i. 38; vessels of, i. 40; weight of after delivery, ii. 247

VAGINA, i. 27; bands and cicatrices of, obstructing delivery, i. 23; contraction of, after delivery, ii. 247; lacerations of, ii. 129; orifice of, i. 25; structure of, i. 28
 Varicose veins in pregnancy, i. 232
 Vectis, ii. 189; action of, ii. 189; cases in which it is applicable, ii. 190
 Veins, entrance of air into, as a cause of sudden death after delivery, ii. 352
 Venosection for rigidity of cervix, ii. 19
 Version. (*See* Turning.)
 Vesico-uterine ligaments, i. 44
 Vesico-vaginal fistula, ii. 129
 Vestibule, i. 24
 Vomiting in pregnancy, i. 209
 Vulva, i. 22; condition of, after delivery, ii. 247; ædema of, obstructing labour, ii. 28; vascular supply of, i. 27
 Vulvo-vaginal glands, i. 26

WEANING. (*See* Lactation.)
 Wet-nurse, selection of, ii. 259
 Woolian bodies, i. 43 and 109
 Wounds of the fœtus, i. 266

ZONA, pellucida, i. 55
 Zymotic disease, affecting the fœtus, i. 263; as a cause of septicæmia, ii. 311

WORKS PUBLISHED BY SMITH, ELDER, & CO

DR. BRAUN.—DR. HERMAN WEBER.

The CURATIVE EFFECTS of BATHS and WATERS; being a Handbook to the Spas of Europe. By Dr. J. BRAUN. With a sketch on the Balneotherapeutic and Climatic Treatment of Pulmonary Consumption, by Dr. L. ROHDEN. An Abridged Translation from the Third German Edition, with Notes. By HERMAN WEBER, M.D., F.R.C.P., London Physician to the German Hospital. Demy 8vo. 18s.

DR. THOMAS KING CHAMBERS.

MANUAL of DIET in HEALTH and DISEASE. By THOMAS KING CHAMBERS, M.D., Hon. Physician to H.R.H. the Prince of Wales; Lecturer on the Practice of Medicine at St. Mary's Hospital; Consulting Physician to St. Mary's and Lock Hospitals. Second Edition. Crown 8vo. 10s. 6d.

RICHARD DAVY, F.R.C.S.

NEW INVENTIONS in SURGICAL MECHANISM. By RICHARD DAVY, F.R.C.S., Surgeon to the Westminster Hospital and to the Surgical Aid Society. 8vo. sewed, 1s. 6d.

DR. GEORGES DIEULAFOY.

A TREATISE on the PNEUMATIC ASPIRATION of MORBID FLUIDS; a Medico-Chirurgical Method of Diagnosis and Treatment of Cysts and Abscesses of the Liver, strangulated Hernia, Retention of Urine, Pericarditis, Pleurisy, Hydrarthrosis, &c. By Dr. GEORGES DIEULAFOY, Gold Medallist of the Hospitals of Paris. Post 8vo. 12s. 6d.

DR. ALEXANDER ECKER.—JOHN C. GALTON.

On the CONVOLUTIONS of the HUMAN BRAIN. By Dr. ALEXANDER ECKER, Professor of Anatomy and Comparative Anatomy in the University of Freiburg, Baden. Translated, by permission of the Author, by JOHN C. GALTON, M.A. Oxon, M.R.C.S., F.L.S. Post 8vo. 4s. 6d.

GEORGE VINER ELLIS, F.R.C.S.

DEMONSTRATIONS of ANATOMY: being a Guide to the Knowledge of the Human Body by Dissection. By GEORGE VINER ELLIS, F.R.C.S., Professor of Anatomy in University College, London. Seventh Edition, revised. With 248 Engravings on Wood. Small 8vo. 12s. 6d.

G. V. ELLIS, F.R.C.S.—G. H. FORD.

ILLUSTRATIONS of DISSECTIONS. In a Series of Original Plates, the Size of Life, representing the Dissection of the Human Body. By G. V. ELLIS and G. H. FORD. Imperial folio. 2 vols. half-bound in morocco, £6. 6s. May also be had in parts, separately. Parts 1 to 28, 3s. 6d. each; Part 29, 5s.

DR. J. MILNER FOTHERGILL.

The MAINTENANCE of HEALTH. A Medical Work for Lay Readers. By J. MILNER FOTHERGILL, M.D., M.R.C.P., Junior Physician to the West London Hospital. Crown 8vo. 12s. 6d.

DR. EDWARD LONG FOX.

The PATHOLOGICAL ANATOMY of the NERVOUS CENTRES. By EDWARD LONG FOX, M.D., F.R.C.S., F.R.C.P., Physician to the Bristol Royal Infirmary; late Lecturer on the Principles and Practice of Medicine and of Pathological Anatomy at the Bristol Medical School. With Illustrations. 8vo. 12s. 6d.

DR. SAMUEL GEE.

AUSCULTATION and PERCUSSION, together with the other Methods of Physical Examination of the Chest. By SAMUEL GEE, M.D. With Illustrations. Fcp. 8vo. 5s. 6d.

DR. SAMUEL D GROSS.

A SYSTEM of SURGERY; Pathological, Diagnostic, Therapeutic, and Operative. By SAMUEL D. GROSS, M.D., LL.D., D.O.L. Oxon. Fifth Edition, greatly Enlarged and thoroughly Revised, with upwards of 1,400 Illustrations. 2 vols. 8vo. £3. 10s.

DR. L. HERMANN.—DR. ARTHUR GAMGEE.

ELEMENTS of HUMAN PHYSIOLOGY. By Dr. L. HERMANN, Professor of Physiology in the University of Zurich. Translated from the Fifth German Edition, with the Author's permission, by ARTHUR GAMGEE, M.D., F.R.S., Brackenbury Professor of Physiology and Histology in the Owens College, Manchester, and examiner in Physiology in the University of Edinburgh.

TIMOTHY HOLMES, F.R.C.S.

SURGERY; its PRINCIPLES and PRACTICE. By TIMOTHY HOLMES, F.R.C.S., Surgeon to St. George's Hospital. With upwards of 300 Illustrations. 8vo. 30s.

BERKELEY HILL, M.B.

The ESSENTIALS of BANDAGING : including the Management of Fractures and Dislocations, with Directions for using other Surgical Apparatus. With 122 Engravings. By BERKELEY HILL, M.B. Lond., F.R.C.S. Third Edition, Revised and Enlarged. Fcp. 8vo. 3s. 6d.

SYPHILIS and LOCAL CONTAGIOUS* DISORDERS. By BERKELEY HILL, M.B. Lond., F.R.C.S. Demy 8vo. 16s.

DR. GEORGE JOHNSON,

LECTURES on BRIGHT'S DISEASE, with Especial Reference to PATHOLOGY, DIAGNOSIS, and TREATMENT. By GEORGE JOHNSON, M.D., F.R.S., Fellow of the Royal College of Physicians, Physician to King's College Hospital, Professor of Medicine, King's College, &c. With numerous Illustrations. Post 8vo. 5s.

DR. E. KLEIN

The ANATOMY of the LYMPHATIC SYSTEM. By E. KLEIN, M.D., F.R.S., Assistant Professor at the Laboratory of the Brown Institution, London, Lecturer on General Histology at the Medical School of St. Bartholomew's Hospital.
Part I. The Serous Membranes. With 10 Double-page Illustrations, 8vo. 10s. 6d.
Part II. The Lung. With Illustrations. 10s. 6d.

S. W. MOORE.

NOTES on DEMONSTRATIONS of PHYSIOLOGICAL CHEMISTRY. By S. W. MOORE, Junior Demonstrator of Practical Physiology at St. George's Medical School, Fellow of the Chemical Society, &c. Crown 8vo. 3s. 6d.

DR. C. MURCHISON.

On FUNCTIONAL DERANGEMENTS of the LIVER. By C. MURCHISON, M.D., LL.D., F.R.S., Physician and Lecturer on Medicine, St. Thomas's Hospital, and formerly on the Medical Staff of H.M. Bengal Army. Crown 8vo. 5s.

GEORGE NAYLER, F.R.C.S.

A PRACTICAL and THEORETICAL TREATISE on DISEASES of the SKIN. By GEORGE NAYLER, F.R.C.S. Second Edition, with Illustrations. 8vo. 12s. 6d.

DR. GEORGE VIVIAN POORE.

A TEXT-BOOK of ELECTRICITY in MEDICINE and SURGERY. By GEORGE VIVIAN POORE, M.D. Lond., M.R.C.P., &c., Assistant-Physician to University College Hospital, Senior Physician to the Royal Infirmary for Children and Women. Crown 8vo. 8s. 6d.

DR. WALTER GEORGE SMITH.

COMMENTARY on the BRITISH PHARMACOPEIA. By WALTER GEORGE SMITH, M.D., Fellow and Censor King and Queen's College of Physicians in Ireland, Examiner in Materia Medica, Q.U.I., Assistant Physician to the Adelaide Hospital. Crown 8vo. 12s. 6d.

DR. WILLIAM ROBERTS.

A PRACTICAL TREATISE on URINARY and RENAL DISEASES, including URINARY DEPOSITS. Illustrated by numerous Cases and Engravings. By WILLIAM ROBERTS, M.D. Third Edition, revised and considerably enlarged. Small 8vo. 12s. 6d.

DR. W. DOMETT STONE.

An EPITOME of THERAPEUTICS. Being a Comprehensive Summary of the Treatment of Disease as recommended by the leading British, American, and Continental Physicians. By W. DOMETT STONE, M.D., F.R.C.S., Crown 8vo. 8s. 6d.

DR. OCTAVIUS STURGES.

An INTRODUCTION to the STUDY of CLINICAL MEDICINE: being a Guide to the Investigation of Disease, for the Use of Students. By OCTAVIUS STURGES, M.D. Cantab., F.R.C.P., Assistant-Physician to Westminster Hospital. Crown 8vo. 4s. 6d.

The NATURAL HISTORY and RELATIONS of PNEUMONIA : a Clinical Study. By OCTAVIUS STURGES, M.D., F.R.C.P., Assistant-Physician to the Westminster Hospital and to the Hospital for Sick Children.

DR. WALTER HAYLE WALSH.

A PRACTICAL TREATISE on the DISEASES of the HEART and GREAT VESSELS: including the Principles of their Physical Diagnosis. By WALTER HAYLE WALSH, M.D. Fourth Edition, thoroughly revised and greatly enlarged. Demy 8vo. 12s.

A PRACTICAL TREATISE on DISEASES of the LUNGS: including the Principles of Physical Diagnosis, and Notes on Climate. By WALTER HAYLE WALSH, M.D. Fourth Edition, Revised and much Enlarged. Demy 8vo. 16s.

